

SBM. 1015

ISSN 0968-0454

Bulletin of The Natural History Museum

THE NATURAL
HISTORY MUSEUM

26 NOV 1997

PRESENTED
GENERAL LIBRARY

Entomology Series



THE
NATURAL
HISTORY
MUSEUM

VOLUME 66 NUMBER 2 27 NOVEMBER 1997

The *Bulletin of The Natural History Museum* (formerly: *Bulletin of the British Museum (Natural History)*), instituted in 1949, is issued in four scientific series, Botany, Entomology, Geology (incorporating Mineralogy) and Zoology.

The Entomology Series is produced under the editorship of the
Keeper of Entomology: Dr R.P. Lane
Editor of Bulletin: Dr Gaden S. Robinson

Papers in the *Bulletin* are primarily the results of research carried out on the unique and ever-growing collections of the Museum, both by the scientific staff and by specialists from elsewhere who make use of the Museum's resources. Many of the papers are works of reference that will remain indispensable for years to come. All papers submitted for publication are subjected to external peer review before acceptance.

A volume contains about 192 pages, made up by two numbers, published in the Spring and Autumn. Subscriptions may be placed for one or more of the series on an annual basis. Individual numbers and back numbers can be purchased and a Bulletin catalogue, by series, is available. Orders and enquiries should be sent to:

Intercept Ltd.
P.O. Box 716
Andover
Hampshire SP10 1YG
Telephone: (01264) 334748
Fax: (01264) 334058

Claims for non-receipt of issues of the Bulletin will be met free of charge if received by the Publisher within 6 months for the UK, and 9 months for the rest of the world.

World List abbreviation: *Bull. nat. Hist. Mus. Lond.* (Ent.)

© The Natural History Museum, 1997

ISSN 0968-0454

The Natural History Museum
Cromwell Road
London SW7 5BD

Entomology Series
Vol. 66, No. 2, pp. 123-171

Issued 27 November 1997

Typeset by Ann Buchan (Typesetters), Middlesex
Printed in Great Britain by Henry Ling Ltd, at the Dorset Press, Dorchester, Dorset

Microtermes in East Africa (Isoptera: Termitidae: Macrotermitinae)

SOLOMON BACCHUS

BRN 308530

[Died 16 January 1996] Natural Resources Institute, Central Avenue, Chatham Maritime, Chatham, Kent ME4 4TB, UK

[Correspondence: Dr J.P.E.C. Darlington, Department of Zoology, University of Cambridge, Downing Street, Cambridge, CB2 3EJ, UK]

CONTENTS

Synopsis	123
Introduction	123
Taxonomic status	124
Distribution in the study area	124
Material and methods	126
Depositories and material	126
Methods and terminology	127
<i>Microtermes</i> Wasmann, 1902	128
Key to imagos	129
Key to soldiers	129
Key to major workers	130
Descriptions of the species	131
Acknowledgements	153
References	153
Index	155

SYNOPSIS. An account is given of the external morphology, distribution and biology of the economically important termite genus *Microtermes* in Kenya, Malawi, Tanzania and Zambia. Twenty species are described and illustrated, and their known distributions are mapped. Twelve of these species are new to science. Keys are given to the imagos of 12 species, and the soldier and worker castes of all 20 species. All available types were examined and appropriate holotypes and lectotypes designated.

INTRODUCTION

The genus *Microtermes* belongs to the subfamily Macrotermitinae, the fungus-growing termites, which probably originated in the Afrotropical region during the Tertiary period (Emerson, 1955). The species are widely distributed throughout tropical Africa and in Indo-Malaysia. Forty species have been described from the African mainland and six from Madagascar (although two of those may perhaps be more correctly located in Africa), two from Arabia and sixteen from Indo-Malaysia.

The species are polyphagous herbivores and detritivores, and many are important pests causing considerable damage to crops and trees throughout

savannah Africa and in irrigated agriculture in arid zones (Harris, 1971; Sen-Sarma, 1980; Wood *et al.*, 1980). Damage is recorded to groundnuts (Sands, 1960; Johnson *et al.*, 1981), jute (Dutt, 1962), maize, (Agarwal & Sharma, 1954; Butani, 1967; Harris, 1969; Kushwara, 1960; Srivasta, 1959; Wood *et al.*, 1980), wheat, paddy and millet (Ghose, 1964; Verma *et al.*, 1978), sugarcane (Agarwal, 1972; Abushama & Kambal, 1977; Harris, 1969), cotton (Wood *et al.*, 1987) and to eucalyptus trees (Thakur & Sen-Sarma, 1980). Some species damage rangeland and post-harvest timber including wooden buildings and fence posts (Harris 1971; Wood 1986; Wood & Pearce, 1991). Certain Macrotermitinae cause significant losses to crops, plantation trees and small (peasant) farmers' wood-and-thatch houses (Cowie & Wood, 1989; Wood, 1991).

The species build diffuse subterranean nest systems (Wood and Johnson, 1978) and may live in the mounds of other termites such as *Macrotermes* and *Odontotermes*, or inside dead wood. Their habits make it laborious and difficult to locate them and to quantify their abundance. Unlike termites of other genera, many are not eliminated by cultivation, as their subterranean nests can be quite deep and they are not dependent on trees and woody litter (Wood *et al.*, 1977; Black and Wood, 1989). Wood *et al.* (1980) found a positive linear relationship between *Microtermes* abundance, number of years of cultivation, crop damage and yield loss in Nigeria.

The present study, begun in 1985, was designed to prepare a comprehensive account of the morphology, distribution and biology, with keys to the species in Kenya, Malawi, Tanzania, and Zambia. Previously published descriptions and keys are very much out of date, and it has been virtually impossible for any worker to name species reliably. Inability to recognise pest species, and to estimate the damage they do, has hindered the development of appropriate strategies for control. Conventional methods used to control *Microtermes* in crops involved the application of persistent insecticides to the soil to form a barrier around roots during the life of the crop. Only the cyclodienes (organochlorines) were persistent enough, but their environmental and human hazards resulted in their use being banned in many developing countries. Attention is shifting towards more sophisticated chemical compounds and biological materials. Such a change in research emphasis demands better information on the biology of the termites, particularly their population ecology, and for this a sound taxonomic basis is essential.

Taxonomic status

The genus *Microtermes* was established by Wasmann (1902) with three included species: *Termes incertus* Hagen (1853), *Termes pallidus* Haviland (1898) and a new species *Microtermes globicola*. He designated *Termes incertus* as the type species, a designation which is accepted in this study. However Chatterjee and Thakur (1964) in their study of Indian *Microtermes* erroneously designated *M. globicola* as the type species, claiming that Wasmann in establishing the genus included only one species from Ceylon without designating it as the type. Bose (1984) and the present author have examined Wasmann's 1902 paper, and have rejected the claim made by Chatterjee and Thakur (1964).

The type specimen of *Microtermes incertus* (Hagen) was deposited in MNHU, Berlin, according to Snyder (1949). Dr. Deckert, who is responsible for the Isoptera collection at this museum, informed the author that they do not have the type of *incertus* and that the material may be stored in the collection of the Mu-

seum of Comparative Zoology, Harvard University, USA. This specimen could not be obtained for study to verify the identity of the type-species of the genus.

Species of *Microtermes* were afterwards recognized by Sjöstedt (1904, 1907, 1911, 1913, 1914, 1915, 1924, 1926), Desneux (1906) Holmgren (1909, 1913), Silvestri (1912, 1914), Fuller, (1922), Oshima (1923), Emerson (1928), Kemner (1934), Grassé (1937), Ghindini (1937, 1955), Cachan (1949), Harris, (1953, 1954, 1958), Ahmad (1955), Roonwal & Chhotani (1962), Tsai & Chen (1963), Akhtar (1975), Wood (1986) and Barnett *et al.* (1990). Snyder (1949) in his catalogue of the termites of the world recognized 35 species and five subspecies in the genus. The present study describes 20 species (12 of them from sterile castes only), of which 12 are new to science.

Distribution in the study area

A summary is given in Table 1 of the distribution of the twenty species described below. The most widely distributed species are *Microtermes redenianus* and *magnocellus*, followed by *albopartitus*, *alluaudanus* and *luteus*. Six species are recorded from Zambia, five from Tanzania, four from Malawi and twelve from Kenya. The large number of species recorded from Kenya results from the extensive collections made in that country by R.K.N. Bagine and the present author.

Kemp (1955) showed that there may be a definite relationship between topography, climate and vegetation, and the distribution of termites in north eastern Tanzania. Coaton (1962) used termite genera to characterise particular vegetation types. Williams (1966) discussed the influence of climate, soil, altitude and vegetation in his study of the geographical distribution of the species of *Cubitermes* in eastern Africa. Sands (1965, 1967) in his revisions of the Nasutitermitinae found that the distributions of species were closely related to the vegetation zones of Keay (1959).

In the present study, Keay's vegetation zones (Figure 1) have been linked with the distribution of *Microtermes* spp. in Kenya, Malawi, Tanzania and Zambia. The 20 recognized species have been reported from six vegetation zones (after Keay, 1959), as follows:

- Zone 4 – Montane communities
- Zone 9 – Coastal forest-savanna mosaic
- Zone 16 – Moist woodlands
- Zone 18 – Myombo (*Brachystegia*) woodland
- Zone 20 – Dry woodlands
- Zone 25 – Wooded steppe with abundant *Acacia* and *Commiphora*

The distribution of the species within these zones is summarized in Table 2. Fourteen of the species (*albopartitus*, *alluaudanus*, *baginei*, *chomaensis*,

Table 1. Distribution of *Microtermes* spp. in the study area.

Species	Zambia	Tanzania	Malawi	Kenya (Coastal)	Kenya (Southern)	Kenya (Western)	Kenya (Central)
albopartitus	+		+				
alluaudanus		+		+	+		
baginei						+	
cheberensis							+
chomaensis	+						
darlingtonae					+		
edwini						+	
etiolatus	+						
kairoonae						+	
logani			+				
lokoriensis							+
lounsburyi	+						
luteus		+	+	+	+		
magnocellus	+	+	+				
mariae						+	
mulii					+		
pamelae	+						
redenianus		+	+		+		
tsavoensis					+		
vadschaggae		+			+		
Total species:	6	5	4	2	7	4	2

Table 2. Distribution of *Microtermes* spp. in Kenya (K), Malawi (M), Tanzania (T), Zambia (Z) and Zimbabwe (Zi) in relation to the vegetation zones of Keay (1959) (see Figure 1).

Vegetation zone:	4	9	16	18	20	25	Zones occupied
Species							
albopartitus				M, Z	Z		2
alluaudanus		K, T	K			K, T	3
baginei	K		K			K	3
cheberensis						K	1
chomaensis				Z			1
darlingtonae			K			K	2
edwini			K				1
etiolatus					Z		1
kairoonae			K				1
logani					M		1
lokoriensis						K	1
lounsburyi				Zi	Z		2
luteus						K	1
magnocellus		T		Z	M		3
mariae			K				1
mulii			K			K	2
pamelae				Z	Z		2
redenianus		K, T	K	T, M	M	K, T	5
tsavoensis						K	1
vadschaggae			K			T	2
Total species:	1	3	9	6	7	10	

darlingtonae, *edwini*, *kairoonae*, *lounsburyi*, *magnocellus*, *mariae*, *mulii*, *pamelae*, *redenianus* and *vadschaggae*) are recorded in moist woodlands and savannas (vegetation zones 16 and 18). *M. alluaudanus*, *magnocellus* and *redenianus* are also recorded from the moister coastal forest and savanna mosaic (vegetation zone 9) and also in somewhat drier conditions

(zones 20 and 25), where the other eleven species also occur. Six species, *cheberensis*, *edwini*, *lokoriensis*, *luteus*, *logani* and *tsavoensis*, are found exclusively in dry conditions (vegetation types 20 and 25). *M. redenianus* is exceptional among all the species of *Microtermes* in being recorded in five of the six vegetation zones (zones 9, 16, 18, 20 and 25), from very

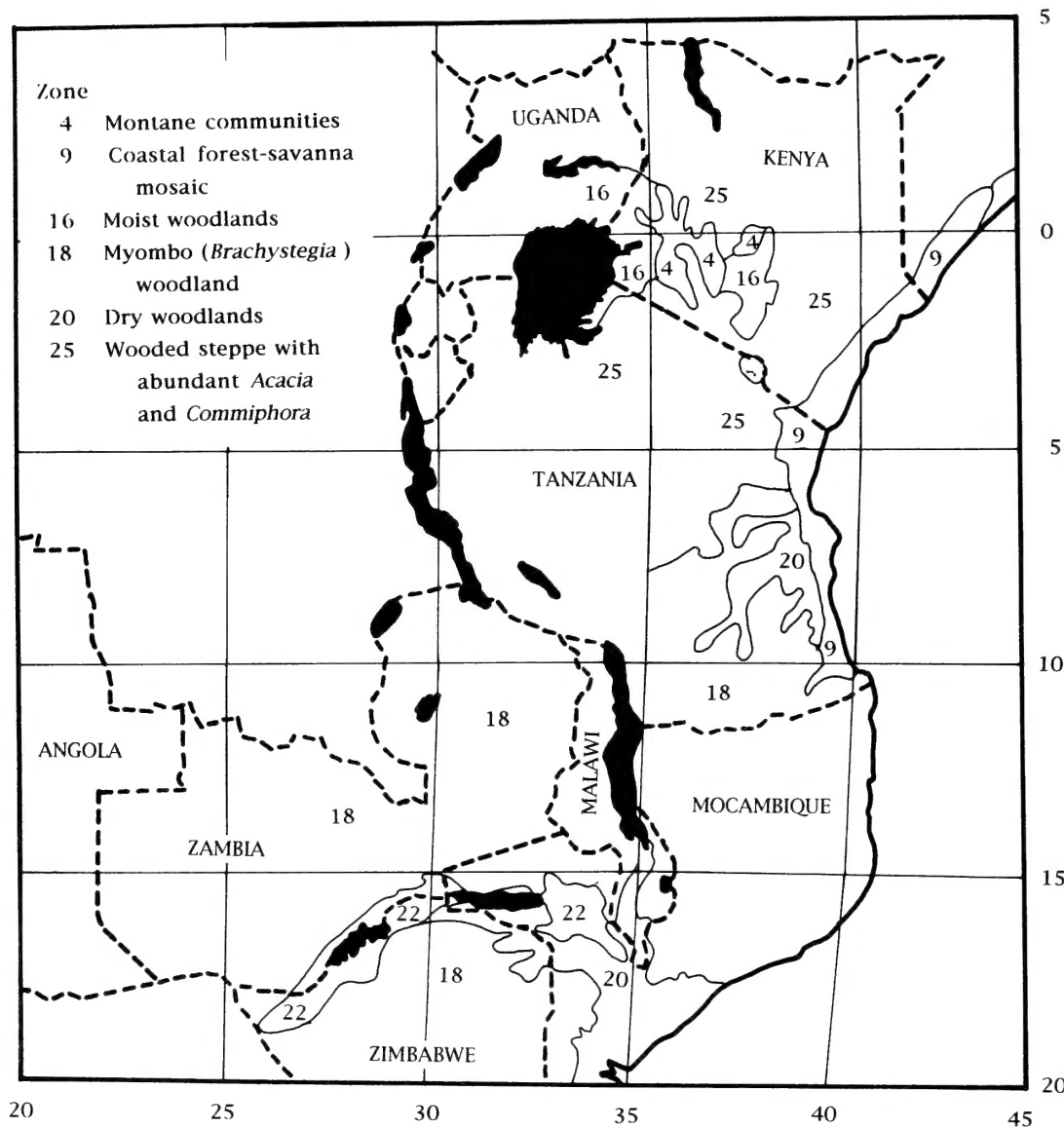


Figure 1. Map showing the distribution of the six vegetation zones in which *Microtermes* spp. have been recorded in the study area, after Keay (1959). The base map is a Zenithal Equal-area projection.

moist coastal savanna to somewhat drier conditions inland. Kemp (1955) found that this species is abundant in woodland and thicket in the plains, extending to an altitude of 1230 m (4000 ft) on the mountain sides in north eastern Tanzania.

Thus, on the evidence available, it seems that several species of *Microtermes* occur only in a single type of vegetation. This is not unusual, as in vegetation type 21, ten species of *Trinervitermes* occur; six are sympatric in the west, and four each in the east, the central area and the south of the Ethiopian Region (Sands, 1967).

MATERIAL AND METHODS

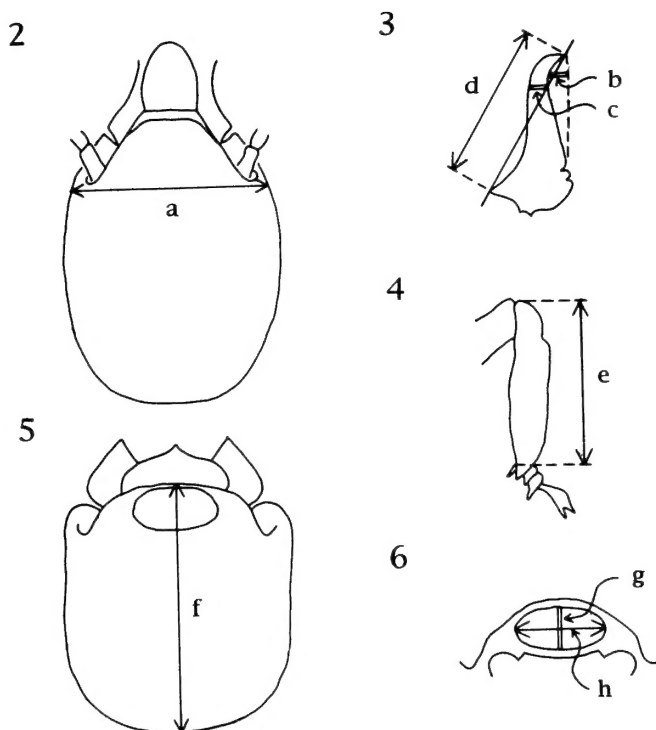
Depositories and material

The following standard institutional abbreviations are used in this work:

AMNH American Museum of Natural History, New York, USA

BMNH The Natural History Museum (formerly British Museum (Natural History)), London, UK

IDEA Istituto di Entomologia Agraria, Portici, Naples, Italy



Figures 2–6. *Microtermes* sp. to show the measurements used: 2, soldier head, dorsal aspect; 3, soldier left mandible, dorsal aspect; 4, leg; 5, worker head, dorsal aspect; 6, worker head, antero-dorsal aspect.

Soldier: a – head width just behind antennal sockets

b – mandible curvature

c – mandible width

d – cross length of left mandible

e – length of tibia

Worker: f – head length to anterior margin of postclypeus

g – postclypeus cushion length

h – postclypeus cushion width

MNHU Museum für Naturkunde der Humboldt-Universität, Berlin, Germany

NCI Plant Protection Research Institute, Pretoria, Republic of South Africa

NMK National Museums of Kenya, Nairobi, Kenya

NR Naturhistoriska Riksmuseet, Stockholm, Sweden

This study is based on the examination of 562 specimens from 248 nest series of material deposited in BMNH, AMNH and NMK. Types and other specimens were also obtained on loan from the museum collections cited above. Except where otherwise stated material examined is from the BMNH collection.

Methods and terminology

The 39 standard measurements for the imago, soldier and worker castes were adopted mainly from Roonwal (1969) and Sands (1972). They were carried out using

a Leitz binocular microscope. The maximum and minimum diameters of the eye of the imago included the structure which is usually referred to as the ocular sclerite. Mandibular and four other measurements for the soldier and worker castes are illustrated in Figs 2–6. Postclypeus length and width in the imago include the cushion and the surrounding rim, while in the worker the rim is excluded. All measurements are in mm. All lectotypes designated have been selected from syntype series to comply with article 74 of the International Code of Zoological Nomenclature. The terms used for colour in the descriptions are mainly from Watson & Perry (1981).

All the old species examined have been redescribed. The descriptions and illustrations are standardized for easy comparison using diagnostic characters and omitting features that have not proved to be of taxonomic value.

MICROTREMES Wasmann

Microtermes Wasmann, 1902: 115. Type species: *Termes incertus* Hagen, 1853: 481, by original designation; holotype queen, **Mozambique** (?MNHU, Berlin [see above]). [Not examined.]

Diagnosis [based on examined species]:

IMAGO. Head capsule deep yellow, pale orange, orange-yellow to orange-brown; frons and genae usually paler; head stippled with many small and large pale yellow dots at bases of setae; fontanelle sometimes a pale spot; anteclypeus and postclypeus pale yellow to yellow, antenna pale yellow to yellow, 1st and 2nd segments sometimes darker; abdominal tergites yellow to orange-brown, sternites paler; legs pale yellow to pale orange-brown, tibiae and tarsi sometimes darker than femora. Wings pale yellow, anterior veins darker. Posterior margin of head arcuate to semi-circular, and evenly rounded, setae numerous above eyes and sometimes behind eyes or with just a few setae sometimes behind eyes, none extending beyond bulge of eyes; vertex depressed or not depressed about region of fontanelle; with or without ridges about fontanelle; medial spot oval, present or absent; epicranial suture incomplete; V present, weakly marked or absent; frons smooth or weakly corrugated; postclypeus swollen, shield-shaped or long bean-shaped; median suture absent, faint or distinct. Eyes and ocelli oval or nearly round. Ocelli close or far from eyes; labrum prominent with transverse sclerotized band, broadest at base, many setae on disc; antenna with 15/16 segments, segments with many setae, 3rd smallest, 1st and 2nd subequal. Mandibles similar to those of *Odontotermes*. Left mandible with apical teeth equal to first marginal, 3rd marginal always separated from 2nd by a distinct notch or indentation, anterior cutting edge of third marginal at least twice as long as posterior; right mandible with posterior cutting edge of second marginal straight; molar plate always with prominent ridges. Pronotum flat, trapezoid with numerous setae, with or without a pallid cross, anterior and posterior margins almost straight or slightly concave; mesonotum and metanotum with shallow to deep obtuse angular notch. Legs with numerous setae; tibial spurs 3:2:2; tarsi 4-segmented. Wings usually long, hairy, punctuate; fore wing longer than hind wing; costa and subcosta fused, bordering the anterior margin, well sclerotized and hairy. Radius similar to costa-subcosta, running close to and parallel with the latter, fusing at distal margin. Median non sclerotic, arising independently from the scale, with 2–5 branches. Cubitus non-sclerotic with 9–15 branches extending to posterior border. Hind wing costa-subcosta and radius as in forewing; me-

dian arising from radius well outside the wing scale; with 2–5 branches; cubitus with 10–16 branches. Abdomen elongate; cerci 2-segmented, both segments with many setae.

SOLDIER. Head capsule yellow, dull yellow to orange; labrum yellow, dark yellow to orange; antenna pale yellow to yellow, sides and first segment sometimes tinged brown. Mandibles brown or reddish brown, bases yellow; postmentum as head or slightly darker than genae; pronotum, abdomen and legs yellow-white to yellow. Head capsule short oval, ovoid, elongate oval to subrectangular; sides parallel, convergent near antennal sockets or posteriorly; posterior margin slightly or broadly and evenly rounded. Head capsule with few to many setae regularly and symmetrically arranged. Labrum narrow to broadly tongue-shaped, with 2 to 5 pairs of setae on anterior half. Mandibles slender to robust, weakly to strongly incurved at tips, left mandible with or without a small tooth; antenna with 12–14 segments (some species with 15, e.g., *Microtermes najdensis* and some Asian species) 3rd smallest, 1st and 2nd subequal. Postmentum short and broad or long and thin. Pronotum saddle-shaped, narrower or nearly as broad as head, anterior margin with shallow to deep obtuse angular notch or shallow to deep V-shaped notch, posterior margin straight or slightly concave. Fore tibia not inflated, or slightly to very inflated. Tibial spurs 3:2:2. Tarsi 4-segmented. Abdomen moderately to densely hairy; cerci 2-segmented, both with many setae.

MAJOR WORKER. Head capsule pale yellow to orange; mandibles brown to reddish brown, bases yellow; antenna, thoracic nota, abdominal tergites, sclerites and legs yellow-white to pale yellow; postclypeus seating dark yellow, yellow-brown, reddish brown to yellow-reddish brown. Head capsule subrectangular, sides nearly parallel or convergent posteriorly, posterior margin broadly and evenly rounded; head setae numerous, regularly and symmetrically arranged; V of epicranial suture present or absent; eyes and ocelli absent, postclypeus swollen, shape varying from small to large squat bean-shaped or thin bean-shaped; anteclypeus flat, medially projecting anteriorly; labrum tip broadly rounded, with incomplete sclerotized band; mandibles as imago; antenna with 13/14 segments, 3rd smallest, 3rd and 4th sometimes same size, 1st and 2nd subequal. Pronotum saddle-shaped with small anterior lobes; anterior margin shallowly concave, with small V-shaped notch or with obtuse angular notch; outer corners rounded, posterior margin almost straight or slightly concave. Legs moderately short and hairy; tibial spurs 3:2:2. Fore coxa conical with one large non-spinelike or nearly spinelike seta on anterior surface; spurs three, dorsal spur well developed, half as

long, nearly as long, or as long as dorsal outer spur. Tarsi 4-segmented. Abdomen moderately hairy, tergites and sternites well demarcated; cerci 2-segmented and hairy.

Key to imagos (12 species)

HLAMPC = Head length to anterior margin of postclypeus; HTL = Hind tibia length; HWAE = Head width across eyes; MED = Maximum diameter of eye (including the structure which is usually referred to as the ocular sclerite); MPNW = Maximum pronotum width.

- 1 HTL 1.60; antenna 16-segmented *pamelae* (p. 000)
- HTL 1.13–1.53; antenna 15/16-segmented 2
- 2 Antenna 16-segmented 3
- Antenna 15-segmented 6
- 3 MPNW + HTL 2.58–2.91 4
- MPNW + HTL 2.30–2.53 5
- 4 Tibiae darker than femora *luteus* (p. 000)
- Tibiae same colour as femora *redenianus* (p. 000)
- 5 Proximal end of tibia darker than femur, head capsule orange-brown to brown *baginei* (p. 000)
- Proximal end of tibia not darker than femur, head capsule deep yellow *albopartitus* (p. 000)
- 6 Body of tibia darker than femur 7
- Body of tibia not darker than femur 10
- 7 Proximal end of tibia darker than femur 8
- Proximal end of tibia not darker than femur 9
- 8 MED 0.43–0.45 *mulii* (p. 000)
- MED 0.35–0.38 *baginei* (p. 000)
- 9 HLAMPC + HTL 2.30–2.43 *albopartitus* (p. 000)
- HLAMPC + HTL 2.23–2.28 *lounsburyi* (p. 000)
- 10 MPNW + HTL 2.52–2.76 11
- MPNW + HTL 2.23–2.48 12
- 11 HLAMPC 1.20–1.22 *etiolatus* (p. 000)
- HLAMPC 1.05–1.18 *alluaudanus* (p. 000)
- 12 Head capsule orange, brown above ocelli or with a brown V-shaped band linking ocelli *mariae* (p. 000)
- Head capsule configuration not as above 13
- 13 MED 0.38–0.43 14
- MED 0.33–0.35 *vadschaggae* (p. 000)
- 14 HLAMPC + HTL 2.30–2.43 *albopartitus* (p. 000)
- HLAMPC + HTL 2.23–2.29 *magnocellus* (p. 000)

Key to soldiers (20 species)

CLLM = Cross length of left mandible (Fig. 3); FTL = Fore tibia length; FTW = Fore tibia width; HLBM = Head length to base of mandibles; HLM = Head length and mandibles; HTL = Hind tibia length; HWBA = Head width just behind antennal sockets; LMC = Left mandible curvature; MHW = Maximum head width; PML = Postmentum length. [A few species key out in more than one place because their measurements overlap.]

- 1 HTL 0.68–0.78; antenna 14-segmented 2
- HTL 0.45–0.63; antenna 12/13-segmented 6
- 2 HLBM 0.73–0.88; PML 0.40–0.45 *redenianus* (p. 000)
- HLBM 0.90–1.23; PML 0.53–0.85 3
- 3 CLLM 0.65–0.75; HLM 1.60–1.90 *lokoriensis* (p. 000)
- CLLM 0.58–0.63; HLM 1.40–1.63 4
- 4 Head oval (Fig. 91); numerous setae on labrum (Fig. 94) *luteus* (p. 000)
- Head elongated oval (Fig. 124); labrum not so setose (Figs 125 and 142) 5
- 5 Mandible width 0.08–0.09 (Fig. 124) *logani* (p. 000)
- Mandible width 0.06–0.07 (Fig. 144) *pamelae* (p. 000)
- 6 Antenna 12-segmented 7
- Antenna 13-segmented 8
- 7 HLBM 0.93–1.10 *magnocellus* (p. 000)
- HLBM 0.75–0.81 *mariae* (p. 000)
- 8 PML 0.55–0.70; head subrectangular 9
- PML 0.33–0.53; head subrectangular or oval 11
- 9 Anterior third of labrum with two long pairs of terminal setae about same length 0.16–0.22, (Fig. 52); PML 0.61–0.70 *alluaudanus* (p. 000)
- Anterior third of labrum not as above; PML 0.53–0.60 10
- 10 Head sides usually tapering to just behind antennal sockets; LMC 0.04–0.06 *albopartitus* (p. 000)
- Head sides usually parallel; LMC 0.03–0.04 *etiolatus* (p. 000)
- 11 FTL + HTL 1.03–1.13 12
- FTL + HTL 0.88–1.01 14
- 12 HLM 1.38–1.55; CLLM 0.51–0.59 13
- HLM 1.20–1.40; CLLM 0.48–0.53 18
- 13 CLLM 0.55–0.59 *tsavoensis* (p. 000)
- CLLM 0.51–0.53 *edwini* (p. 000)
- 14 Head subrectangular (Fig. 103) *mariae* (p. 000)
- Head oval (Fig. 79) 15

- 15 HLBM 0.88–1.00 *edwini* (p. 000)
 – HLBM 0.70–0.80 16
- 16 FTL + HTL 0.98–1.00 *lounsburyi* (p. 000)
 – FTL + HTL 0.88–0.94 17
- 17 Anterior third of labrum with 3 pairs of setae, terminal pair long, posterior pairs very short, less than half length of long pair (Fig. 118) *kairoonae* (p. 000)
 – Anterior third of labrum with 4 pairs of setae, terminal pair long, posterior pairs longer than 0.3 length of terminal pair (Fig. 70) *chomaensis* (p. 000)
- 18 Pair of frons setae 0.06–0.07 apart (Fig. 109)
 *mulii* (p. 000)
 – Pair of frons setae further apart 19
- 19 Head moderately pear-shaped (Figs 73 and 157); MHW minus HWBA 0.05–0.10 20
 – Head weakly pear-shaped or parallel-sided (Figs 55 and 61); MHW minus HWBA 0.00–0.04 22
- 20 Western Kenya *baginei* (p. 000)
 – Tanzania, Southern and Central Kenya 21
- 21 HTL 0.55–0.60 *vadschaggae* (p. 000)
 – HTL 0.54–0.55 *darlingtonae* (p. 000)
- 22 HLBM 0.80–0.78 *baginei* (p. 000)
 – HLBM 0.76–0.78 *cheberensis* (p. 000)
- 7 HTL 0.59–0.63; Northern Kenya . *cheberensis* (p. 000)
 – HTL 0.43–0.58; not from Northern Kenya 8
- 8 Dorsal spur of fore tibia nearly or as long as ventral outer spur 11
 – Dorsal spur of fore tibia much shorter than ventral outer spur 9
- 9 HTL 0.43–0.45, PNW 0.40–0.43 *kairoonae* (p. 000)
 – HTL 0.48–0.58, PNW 0.43–0.50 10
- 10 PCL 0.18–0.20, FTL 0.48–0.50; Western Kenya
 *baginei* (p. 000)
 – PCL 0.21–0.23, FTL 0.43–0.48; Malawi, Zambia
 *albopartitus* (p. 000)
- 11 PCW 0.34–0.40 12
 – PCW 0.30–0.35 15
- 12 Median suture of postclypeus distinct 13
 – Median suture of postclypeus faint
 *alluaudanus* (p. 000)
- 13 PCL 0.20–0.21, postclypeus seating distinctly brown; Tanzania, Central and Southern Kenya
 *vadschaggae* (p. 000)
 – PCL 0.21–0.26, postclypeus seating yellow reddish brown; Kenya (Kajiado, Tsavo) 14
- 14 HW 0.80–0.83, HTL 0.50–0.55; Kenya (Kajiado)
 *mulii* (p. 000)
 – HW 0.75–0.83, HTL 0.48–0.50; Kenya (Tsavo)
 *tsavoensis* (p. 000)
- 15 PCW 0.30–0.31 16
 – PCW 0.32–0.35 17
- 16 Anterior margin of pronotum with small V-shaped median notch, postclypeus small squat bean-shaped
 *chomaensis* (p. 000)
 – Anterior margin of pronotum with shallow broad V-shaped median notch; postclypeus very squat bean-shaped
 *magnocellus* (p. 000)
- 17 Western Kenya 18
 – Coastal and Central Kenya, Tanzania, Malawi, and Zambia 19
18. HCL 0.95–1.00; HTL 0.49–0.50 *edwini* (p. 000)
 – HCL 0.88–0.89; HTL 0.45–0.48 *mariae* (p. 000)
19. HCL 0.95–1.03; suture on postclypeus faint
 *alluaudanus* (p. 000)
 – HCL 0.88–0.96; suture on postclypeus distinct 20
20. Central Kenya; PCL 0.18–0.20 .. *darlingtonae* (p. 000)
 – Zambia, Malawi, Tanzania; PCL 0.18–0.23 21
21. Head sides nearly parallel (Fig. 196)
 *lounsburyi* (p. 000)
 – Head sides faintly or distinctly convergent posteriorly (Fig. 202) *magnocellus* (p. 000)

Key to major workers (20 species)

HCL = Head length to anterior margin of postclypeus; HTL = Hind tibia length; HW = Maximum head width; PCL = Postclypeus cushion length; PCW = Postclypeus cushion width; PNW = Maximum pronotum width.

- 1 Antenna 14-segmented 2
 – Antenna 13-segmented 6
- 2 HTL 0.73–0.78 *luteus* (p. 000)
 – HTL 0.55–0.70 3
- 3 PCW 0.35–0.39, HW 0.85–0.95; Northern Kenya
 *lokoriensis* (p. 000)
 – PCW 0.37–0.45, HW 0.88–1.10; Southern and Coastal Kenya, Malawi, Zambia and Tanzania 4
- 4 HCL 1.15–1.23, HW 1.00–1.10; Zambia and Zimbabwe
 *paradoxus* (p. 000)
 – HCL 1.00–1.18, HW 0.88–1.03; Southern and Coastal Kenya, Malawi and Tanzania 5
- 5 Fore tibia length 0.53–0.60 *redenianus* (p. 000)
 – Fore tibia length 0.50 *logani* (p. 000)
- 6 HTL 0.68 *etirolatus* (p. 000)
 – HTL 0.43–0.63 7

Descriptions of the species

Microtermes albopartitus (Sjöstedt)

(Figs 7–9 imago; 43–48 soldier; 163–165 major worker; 223 distribution)

Termes albopartitus Sjöstedt, 1911: 4. LECTOTYPE soldier, Zimbabwe (BMNH), here designated [examined].

Microtermes longiceps Holmgren, 1913: 330, 334. [Synonymized by Snyder 1949: 247] [Type material not examined.]

IMAGO. Head capsule deep yellow; frons and genae paler; vertex stippled with many small and large pale yellow dots at base of hairs; fontanelle a small pale brown spot; anteclypeus yellow-white; postclypeus, antennae, labrum and pronotum yellow; abdominal tergites pale yellow; sternites paler; legs pale yellow; tibiae and tarsi sometimes just darker than femora. Wings pale yellow, anterior veins darker. Posterior margin of head capsule arcuate and evenly rounded; setae numerous above eyes, few behind eyes, none extending beyond bulge of eyes; vertex slightly or not depressed around fontanelle; low median ridge extending anteriorly from about fontanelle; epicranial suture incomplete, weakly marked or absent; frons smooth, sloping gently towards postclypeus; postclypeus shield-shaped, median line absent or distinct. Eyes and ocelli oval; labrum shorter than wide; antennae 15/16-segmented, 3rd smallest, 1st, 2nd and 4th subequal. Pronotum with numerous setae, with or without a pallid cross; anterior margin concave, sides rounded, posterior margin almost straight or slightly concave; mesonotum with broad, deep v-shaped hind margin, metanotum hind margin moderately shallow. Wings extending beyond body to about twice length of abdomen.

Measurements (12 specimens from 8 nest series) (mm):

	Range	Mean
Head length to anterior margin of postclypeus	1.05–1.15	1.09
Head width across eyes	1.15–1.33	1.23
Postclypeus length	0.30–0.38	0.34
Postclypeus width	0.55–0.63	0.60
Labrum length	0.30–0.38	0.34
Maximum labrum width	0.43–0.50	0.48
Maximum diameter of eye	0.38–0.43	0.39
Minimum diameter of eye	0.30–0.40	0.35
Maximum diameter of ocellus	0.15–0.23	0.17
Minimum diameter of ocellus	0.10–0.15	0.12
Distance ocellus to eye	0.02–0.05	0.03
Maximum pronotum length	0.73–0.85	0.78
Maximum pronotum width	1.05–1.20	1.12
Hind tibia length	1.23–1.33	1.26

SOLDIER. Head capsule yellow; labrum yellow to dark yellow; antennae, pronotum, abdomen and legs pale yellow; mandibles brown or reddish brown, bases yellow; postmentum yellow, as genae. Head capsule subrectangular, posterior margin slightly rounded, sides parallel or converging near antennal sockets; head with many short and a few long setae, regularly and symmetrically arranged; labrum broadly tongue-shaped, almost as wide as long; anterior half with 8–10 setae. Mandibles moderately robust, incurved apically, curvature 0.04–0.06mm. Antennae 13-segmented, 3rd smallest, 4th much larger, 1st and 2nd subequal. Postmentum moderately long. Pronotum narrower than head, lobes with several long and short setae; anterior margin with shallow obtuse angular notch, posterior margin slightly concave, corners rounded. Fore tibia slightly inflated; spurs three, dorsal spur as long as outer ventral spur. Long seta on anterior surface of coxa not spine-like.

Measurements (33 specimens from 21 nest series) (mm):

	Range	Mean	Type
Head length with mandibles	1.33–1.65	1.35	1.50
Head length to base of mandibles	0.88–1.13	0.98	0.98
Head width just behind antennal sockets	0.65–0.78	0.71	0.71
Maximum head width	0.70–0.80	0.73	0.73
Labrum length	0.20–0.30	0.27	0.23
Maximum labrum width	0.20–0.23	0.22	0.23
Cross length of left mandible	0.50–0.58	0.52	0.53
Left mandible width	0.05–0.08	0.06	0.08
Left mandible curvature	0.04–0.06	0.05	0.05
Fore tibia length	0.48–0.55	0.54	0.52
Fore tibia width	0.11–0.13	0.12	0.11
Hind tibia length	0.56–0.63	0.57	–
Hind tibia width	0.09–0.11	0.10	–
Maximum pronotum width	0.43–0.53	0.48	–
Postmentum length	0.53–0.60	0.57	0.60
Maximum postmentum width	0.30–0.38	0.33	0.31

MAJOR WORKER. Head capsule yellow, mandibles reddish brown, bases yellow; antennae, pronotum, legs and abdomen pale yellow; postclypeus seating yellow-reddish brown. Head capsule subrectangular, sides nearly parallel, posterior margin broadly and evenly rounded; head setae numerous, regularly and symmetrically arranged; epicranial suture absent; postclypeus swollen, squat bean-shaped, with distinct median suture, posterior margin evenly rounded; anteclypeus flat but medially projecting; labrum with incomplete transverse sclerotized band, tip broadly rounded; antennae 13-segmented, 3rd smallest, 4th slightly larger, 1st and 2nd subequal. Pronotum saddle-shaped with small anterior lobes, front margin shallowly concave, outer corners rounded, posterior

margin almost straight. Fore tibia not inflated; fore coxa conical, large seta on anterior surface not spine-like; spurs three, dorsal spur well developed, about same length as outer ventral spur.

Measurements (6 specimens from 5 nest series) (mm):

	Range	Mean
Head length to anterior margin of postclypeus	0.95–1.00	0.97
Maximum head width	0.78–0.85	0.82
Postclypeus cushion length	0.21–0.23	0.22
Postclypeus cushion width	0.36–0.38	0.37
Maximum pronotum width	0.43–0.50	0.45
Fore tibia length	0.43–0.48	0.45
Fore tibia width	0.09–0.10	0.09
Hind tibia length	0.48–0.53	0.51
Hind tibia width	0.08	0.08

BIOLOGY. Collection records refer to colonies from *Odontotermes*, *Cubitermes* and *Macrotermes* mounds; from rotten logs; in compost and in dead stumps.

VARIATION. There is wide variation in size in the soldier and worker castes. This feature was observed by Sjöstedt and Holmgren who both commented that it did not relate to two species but to the same species. The small soldiers are much more abundant than the larger ones.

COMPARISON. The imago of *albopartitus* comes close to that of *alluaudanus*, *etiolatus* and *vadschaggae*. The soldier comes closest to *etiolatus* and there is no clear distinction between the two. The worker is smaller than *etiolatus*, but very similar to *alluaudanus* from which it is not readily separable except by its distribution. See the keys for differentiating characters.

MATERIAL EXAMINED.

Lectotype soldier (of *albopartitus*), **Zimbabwe**, Harare.

Other material: **Zimbabwe**, Harare, Chenanga 1.xii.1969, 25.xi.1964, 18.x.1965, 5 vials (*Marshall*) (*Mitchell*) (*Bingham*); **Zambia**, Lusaka, Choma, Chipata, Moike Serenje, near Broken Hill, 1 mile South of Kafue river bridge, 5.xii.1966, 20.i.1957, 5.xi.1967, 18.i.1957, 24.xii.1969 (*Bingham*) (*Coaton*); **Malawi**, 7 miles from Mota-Mota on Kasungo Road, 35 miles from Lilongwe, 10 miles from Bilala on Fort Johnstone Road, 10 miles from Lake Shirwa on Zomba Road, 17.ix.1953, 9.xi.1953, 27.viii.1953, 31.vii.1953 (*Sands*, *Wilkinson*).

Microtermes alluaudanus (Sjöstedt)

(Figs 10–12 imago; 49–54 soldier; 166–168 major worker; 224 distribution)

Termes (*Microtermes*) *alluaudanus* Sjöstedt, 1915:

13–16. Paratype imago, soldier: **Kenya** (AMNH) [examined].

IMAGO. Head capsule yellow to orange-yellow stippled with many yellow dots at base of hairs; frons and middle of vertex paler; anteclypeus and labrum yellow-white, postclypeus pale yellow; labrum, pronotum, mesonotum and metanotum pale yellow, pronotum distinctly paler than head; antennae pale yellow, 1st and 2nd segments darker; abdomen and legs uniform pale yellow. Wings pale yellow to yellow, anterior veins darker yellow. Posterior margin of head capsule arcuate and evenly rounded; setae numerous above eyes, few behind eyes, none extending beyond bulge of eyes; vertex with a few ridges about region of fontanelle; fontanelle absent; medial spot oval, smaller than ocellus; epicranial suture absent, sometimes V present; frons smooth, sloping gently towards postclypeus; postclypeus shield-shaped, median line faint. Labrum shorter than wide. Eyes and ocelli oval, ocelli close to eyes. Antennae 15-segmented, 3rd smallest, 1st and 2nd subequal. Pronotum with numerous setae, anterior and posterior margins slightly concave. Mesonotum and metanotum with wide v-shaped hind margins. Wings very long, extending beyond abdomen to about or greater than body length.

Measurements (8 specimens from 5 nest series) (mm):

	Range	Mean	Type
Head length to anterior margin of postclypeus	1.05–1.18	1.07	1.10
Head width across eyes	1.25–1.35	1.29	1.27
Postclypeus length	0.26–0.28	0.29	0.28
Postclypeus width	0.58–0.59	0.58	0.58
Labrum length	0.33–0.38	0.35	0.38
Maximum labrum width	0.45–0.48	0.45	0.45
Maximum diameter of eye	0.40–0.43	0.40	0.41
Minimum diameter of eye	0.35–0.38	0.37	0.37
Maximum diameter of ocellus	0.18–0.21	0.19	0.17
Minimum diameter of ocellus	0.14–0.15	0.15	0.15
Distance of ocellus to eye	0.03	0.03	0.03
Maximum pronotum length	0.80–0.93	0.81	0.83
Maximum pronotum width	1.18–1.38	1.21	1.29
Hind tibia length	1.33–1.38	1.34	1.30

SOLDIER. Head capsule yellow, dull yellow to orange; labrum as head or slightly darker; mandibles brown or reddish brown, bases yellow; antennae pale yellow or yellow; postmentum as genae; pronotum, abdomen and legs yellow-white, pale yellow, yellow to pale orange. Head capsule subrectangular; sides converging anteriorly from just behind antennal sockets; head with several short and a few long setae, regularly and symmetrically arranged; labrum tongue-shaped, reaching beyond middle of mandibles, widest near base with sides converging anteriorly to a pointed apex, anterior third with two

terminal, conspicuous, long pairs of setae of about the same length, 0.16–0.22mm; posterior pair or pairs distinctly shorter. Mandibles robust, moderately incurved apically, curvature 0.04–0.06mm. Antennae 13-segmented, 3rd smallest, 1st and 2nd subequal; postmentum long, 0.61–0.70mm. Pronotum narrower than head capsule, lobes with several long and short setae; anterior margin with shallow to deep v-shaped notch, posterior margin slightly concave. Fore tibia not inflated; spurs three, dorsal spur as long as outer ventral spur; long seta on anterior surface of fore coxa not spine-like.

Measurements (31 specimens from 20 nest series) (mm):

	Range	Mean	Type
Head length with mandibles	1.59–1.74	1.65	1.63
Head length to base of mandibles	1.02–1.15	1.08	1.07
Head width just behind antennal sockets	0.65–0.75	0.70	0.69
Maximum head width	0.68–0.80	0.73	0.70
Labrum length	0.26–0.30	0.29	0.30
Maximum labrum width	0.19–0.24	0.22	0.22
Cross length of left mandible	0.59–0.63	0.62	0.63
Mandible width	0.07	0.07	0.07
Mandible curvature	0.04–0.06	0.05	0.04
Fore tibia length	0.46–0.48	0.47	0.46
Fore tibia width	0.11	0.11	0.11
Hind tibia length	0.52–0.56	0.55	0.56
Hind tibia width	0.07–0.09	0.08	0.09
Maximum pronotum width	0.48–0.52	0.50	0.48
Postmentum length	0.61–0.70	0.65	0.63
Maximum postmentum width	0.28–0.30	0.29	0.30
Length of terminal labrum setae	0.16–0.22	0.19	0.16

MAJOR WORKER. Head capsule pale yellow; mandibles brown, bases pale yellow; antennal flagellum, pronotum, legs, abdominal tergites and sclerites pale yellow; postclypeus seating yellow-brown to yellow-reddish brown. Head capsule subrectangular, sides convergent posteriorly, slightly wider in front of antennal sockets; posterior margin broadly and evenly rounded; head setae very numerous, regularly and symmetrically arranged; fork of epicranial suture present; eyes and ocelli absent; postclypeus squat bean-shaped with faint median suture; posterior margin evenly rounded; anteclypeus flat medially, projecting anteriorly; labrum with long and wide incomplete sclerotized band, tip broadly rounded; antennae 13-segmented, 3rd smallest, 4th slightly larger 1st and 2nd subequal. Pronotum saddle-shaped, with small anterior lobes; front margin with obtuse angular notch, outer corners rounded, posterior margin shallowly concave. Fore tibia not inflated; fora coxa conical with moderately large seta on anterior surface; spurs three, dorsal spur well developed, almost as long as outer ventral spur.

Measurements (8 specimens from 8 nest series) in millimetres

	Range	Mean
Head length to anterior margin of postclypeus	0.95–1.03	0.98
Maximum head width	0.76–0.85	0.80
Postclypeus cushion length	0.21–0.25	0.23
Postclypeus cushion width	0.34–0.40	0.38
Pronotum width	0.45–0.50	0.48
Fore tibia length	0.43–0.45	0.44
Fore tibia width	0.09–0.10	0.09
Hind tibia length	0.50–0.53	0.52
Hind tibia width	–0.08	0.08

BIOLOGY. The nest of this species is subterranean, and the fungus gardens are in the shape of small spheres, generally aggregated in groups of four or five. The queen occurs in an undifferentiated position below them (Kemp, 1955). Collection records refer to colonies from *Macrotermes* mounds and from dead plant material such as tree trunks, branches of *Acacia*, and roots of old standing maize stubble in cultivated fields of young maize and pigeon peas.

COMPARISON. The imago of this species is close to that of *etiolatus*, *albopartitus* and *vadschaggae*. It can be separated from these species by its smaller postclypeus, 0.26–0.28mm. The soldier is distinct from other species, in that the anterior half of the labrum has two pairs of long setae of equal length. The workers are similar to *albopartitus* and not clearly separable.

MATERIAL EXAMINED. Paratype imago, soldier: **Kenya**, Likoni, 24.x.1952 (AMNH).

Other material: **Kenya**, Gedi, Mombasa, Festland near Mombasa, Ukunda, Tharaka, Mito Andei, Mtwapa Creek, Kwale, Tiwi, Thika, Embu, 9.vi.1950, 24.x.1952, 10.viii.1950, 7.vi.1952, 16.viii.1950, 22.x.1951, 3.vi.1952, 12.v.1952, 26.x.1950, 16.vii.1950, 25.iii.1990, 26.iii.1990 (*Harris*) (*Kemp*) (*Sands*) (*Bacchus*); **Tanzania**, Toronto, Tanga, Malindi, Kihurio, Mwakijembe, Daluni (*Kemp*) (*Clover*, *Kistner*) (*Wilkinson*).

Microtermes baginei sp.n

(Figs 13–15 imago; 55–60 soldier; 169–171 major worker; 225 distribution)

IMAGO. Head capsule orange-brown to brown, frons and genae pale; head stippled with pale yellow dots at bases of setae; anteclypeus yellow-white, labrum yellow; antennae pale yellow, basal segments darker, sides brown. Pronotum pale orange, darker than postclypeus, with a pale median streak. Abdominal tergites and legs pale orange-brown; proximal end of

tibiae with a darker narrow band. Posterior margin of head capsule arcuate and evenly rounded; setae numerous above and behind eyes, none extending beyond bulge of eyes; vertex slightly or not depressed about region of fontanelle; fontanelle a small round pore, situated behind a line about middle region of eyes; medial spot oval, smaller than ocellus; epicranial suture indistinct or absent; frons smooth, sloping towards postclypeus. Eyes and ocelli oval, ocelli markedly separated from eyes by a distance less than half the minimum ocellar diameter; postclypeus not quite semi-circular, median suture distinct; labrum shorter than wide; antennae 15/16-segmented, 3rd smallest, 1st, 2nd and 4th subequal. Pronotum with numerous setae, anterior margin almost straight, posterior margin slightly concave; mesonotum and metanotum without median line, posterior margins with deep obtuse angular notch. Wings extending beyond abdomen to about twice length of body.

Measurements (6 specimens, 4 nest series) (mm):

	Range	Mean
Head length to anterior margin of postclypeus	1.05–1.15	1.12
Head width across eyes	1.20–1.33	1.26
Postclypeus length	0.28–0.31	0.30
Postclypeus width	0.58–0.60	0.59
Labrum length	0.33–0.35	0.34
Maximum labrum width	0.45–0.50	0.48
Maximum diameter of eye	0.35–0.38	0.37
Minimum diameter of eye	0.30–0.35	0.33
Maximum diameter of ocellus	0.15–0.18	0.16
Minimum diameter of ocellus	0.13–0.15	0.14
Distance of ocellus to eye	0.04–0.05	0.04
Maximum pronotum length	0.70–0.85	0.76
Maximum pronotum width	1.10–1.23	1.14
Hind tibia length	1.30–1.38	1.32

SOLDIER. Head capsule pale yellow to orange; labrum yellow to orange; mandibles brown to reddish brown, bases yellow; antennae, thoracic nota, abdomen and legs pale yellow, postmentum as head capsule. Head capsule elongate oval, posterior margin broadly rounded; sides broadest posteriorly, converging near antennal sockets. Head setae numerous, regularly and symmetrically arranged. Labrum narrowly tongue-shaped, reaching almost to tip of mandibles; anterior one-third with 4 pairs of setae (Fig.55). Mandibles moderately robust, incurved at tip. Antennae 13-segmented, 3rd smallest, 4th and 5th similar and slightly larger than 3rd, 1st and 2nd subequal. Pronotum saddle-shaped, narrower than head capsule, with small anterior lobes divided by an obtuse angular notch, posterior lobe large, almost semicircular, margin slightly concave. Fore tibia very inflated, spurs three, dorsal spur as long as ventral outer spur. Longest seta on coxa not spine-like.

Measurements (32 specimens, 16 nest series).

	Range	Mean	Type
Head length with mandibles	1.25–1.45	1.33	1.45
Head length to base of mandibles	0.80–0.95	0.87	0.95
Head width just behind antennal sockets	0.66–0.78	0.69	0.75
Maximum head width	0.68–0.83	0.74	0.83
Labrum length	0.28–0.34	0.29	0.34
Maximum labrum width	0.19–0.24	0.20	0.23
Cross length of left mandible	0.48–0.55	0.46	0.55
Left mandible width	0.05–0.07	0.06	0.07
Left mandible curvature	0.04–0.06	0.05	0.05
Fore tibia length	0.48–0.53	0.49	0.53
Fore tibia width	0.15	0.15	0.15
Hind tibia length	0.55–0.63	0.58	0.63
Hind tibia width	0.07–0.13	0.11	0.12
Maximum pronotum width	0.44–0.54	0.48	0.53
Postmentum length	0.38–0.45	0.42	0.45
Maximum postmentum width	0.30–0.35	0.33	0.35

MAJOR WORKER. Head capsule yellow to pale orange; postclypeus seating reddish brown; mandibles reddish brown, bases yellow; antennae, thoracic nota, abdomen and legs pale yellow; anteclypeus and labrum yellow-white; postclypeus yellow; postmentum paler than genae. Head capsule subrectangular, sides convergent behind, slightly wider in front of antennal sockets; posterior margin evenly rounded; head setae very numerous, regularly and symmetrically arranged; fork of epicranial suture present or absent; postmentum with a few long setae; antennae 13-segmented, 3rd smallest, 4th and 5th similar in size, slightly larger than 3rd, 1st and 2nd subequal; postclypeus swollen, squat bean-shaped with distinct median suture, posterior margin not evenly rounded; anteclypeus flat, medially projecting anteriorly; labrum with incomplete sclerotized band, tip broadly rounded. Pronotum saddle-shaped with small anterior lobes, anterior margin with obtuse angular notch, corners rounded; posterior margin slightly concave. Fore tibia not inflated; spurs three, dorsal spur more than half length of outer ventral spur; fore coxa conical, large seta on anterior surface not spine-like.

	Range	Mean
Head length to anterior margin of postclypeus	0.98–1.03	1.00
Maximum head width	0.78–0.88	0.84
Postclypeus cushion length	0.18–0.20	0.19
Postclypeus cushion width	0.35–0.40	0.37
Maximum pronotum	0.48–0.50	0.49
Fore tibia length	0.48–0.50	0.49
Fore tibia width	0.10	0.10
Hind tibia length	0.50–0.58	0.54
Hind tibia width	0.08	0.08

BIOLOGY. Collection records refer to colonies from *Pseudacanthotermes*, *Odontotermes* and *Macrotermes* nests, from rotten tree stumps, roots, and from stems of ripe maize and under a dead log in highly cultivated areas. Alates were found swarming at 18.45 h on April 5th from small holes in the ground. Around the flight holes were numerous soldiers and workers.

COMPARISON. Imagos, soldiers and workers are closest to those of *mulii*. In *baginei* soldiers the fore tibia is inflated, while the fore tibia in *mulii* is not. In *baginei* workers the postclypeus cushion is smaller than that of *mulii*. See the keys for differentiating characters.

MATERIAL EXAMINED.

Holotype soldier: **Kenya**, Masai Mara, 15.v.1987 (*Bacchus*, *Bagine*).

Paratype, imagos, soldiers, same data as holotype; and **Kenya**, Narok, Kileluni; Esuite; Sotik, Kisabei; Chepiri; Kisumu, Kajulu, Kibos, Miwani, Korandu, Tido Kakamega, Ebuyula; Nakuru, 29 km from Nakuru town on main road, 16.v.1987, 17.v.1987, 18.v.1987, 22.v.1987, 23.v.1987, 24.v.1987, 5.iv.1990 (*Bacchus*, *Bagine*).

Microtermes cheberensis sp.n

(Figs 61–66 soldier; 175–177 major worker; 226 distribution)

IMAGO. Unknown.

SOLDIER. Head capsule yellow, labrum pale orange; mandibles brown, bases yellow; postmentum yellow, as genae; pronotum, abdomen, legs and antennae pale yellow, sides of antennal segments tinged brown. Head capsule short oval to ovoid, sides convergent anteriorly, with a few short and long setae, dorsal surface with many short and long setae symmetrically arranged; posterior margin slightly rounded; labrum long and moderately broad, lateral margins slightly convex, converging to pointed tip, anterior half with 8 setae. Mandibles slender, almost as long as head, weakly incurved at tip, curvature 0.03mm. Antenna 13segmented, 3rd smallest, 4th slightly larger, 1st and 2nd subequal. Postmentum short, almost as wide as long. Pronotum saddle-shaped, nearly as broad as head capsule; anterior margin with shallow median notch, posterior margin slightly concave; laterally with several long setae. Fore tibia moderately inflated. Spurs three, dorsal spur about half length of outer ventral spur. Single long seta on fore coxa not spine-like.

Measurements (5 specimens from 3 nest series) (mm):

	Range	Mean	Type
Head length with mandibles	1.25–1.30	1.28	1.28
Head length to base of mandibles	0.76–0.78	0.77	0.78
Head width just behind antennal sockets	0.63–0.65	0.64	0.63
Maximum head width	0.65–0.68	0.66	0.67
Labrum length	0.28–0.30	0.29	0.30
Maximum labrum width	0.20	0.20	0.20
Cross length of left mandible	0.53–0.55	0.54	0.54
Left mandible width	0.04	0.04	0.04
Left mandible curvature	0.03	0.03	0.03
Fore tibia length	0.50–0.53	0.51	0.50
Fore tibia width	0.13–0.14	0.14	0.14
Hind tibia length	0.58–0.60	0.59	0.60
Hind tibia width	0.10	0.10	0.10
Maximum pronotum width	0.49–0.50	0.50	0.50
Postmentum length	0.38	0.38	0.38
Maximum postmentum width	0.33	0.33	0.33

MAJOR WORKER. Head capsule yellow; mandibles brown, bases yellow; antennae, abdominal tergites, sternites and legs pale yellow; postclypeus seating yellow-brown. Head capsule squarish, slightly broader anteriorly, broadly rounded posteriorly; head with numerous setae, regularly and symmetrically arranged; epicranial suture faint, postclypeus swollen, very squat bean-shaped, median suture faint to distinct; anteclypeus flat, medially projecting anteriorly; labrum broadly rounded; antennae 13-segmented, 3rd smallest, 4th and 5th similar, 1st and 2nd subequal; postmentum with a few setae. Pronotum saddle-shaped, anterior margin with very shallow broad v-shaped median notch, posterior margin almost straight, laterally rounded into posterior margin. Fore tibia not inflated; dorsal spur well developed, nearly as long as ventral outer spur. Single seta on fore coxa not spine-like.

Measurements (5 specimens, 1 nest series) (mm):

	Range	Mean
Head length to anterior margin of postclypeus	1.08–1.10	1.09
Maximum head width	0.94–0.95	0.95
Postclypeus cushion length	0.24–0.25	0.25
Postclypeus cushion width	0.40–0.41	0.41
Maximum pronotum width	0.47–0.48	0.48
Fore tibia length	0.49–0.50	0.50
Fore tibia width	0.09–0.10	0.10
Hind tibia length	0.59–0.60	0.60
Hind tibia width	0.08	0.08

COMPARISON. The soldier and workers of *cheberensis* are close to those of *baginei*. The worker of *cheberensis* is not as hairy as that of *baginei* and its postclypeus is slightly larger. See the keys for differentiating characters.

MATERIAL EXAMINED.

Holotype soldier: **Kenya**, Cheberen, 17 km from Tenges on the road to Eldama Ravine, in dead twigs, 5.iv.1990 (*Bacchus*, *Bagine*).

Paratypes, soldiers, same data as holotype; and **Kenya**, 39 miles from Lake Baringo on C77 road, in forest, 6.iv.90 (*Bacchus*, *Bagine*).

Microtermes chomaensis sp.n

(Figs 67–72 soldier; 172–174 major worker; 227 distribution)

IMAGO. Unknown.

SOLDIER. Head capsule and labrum yellow to orange, mandibles brown, bases yellow; antennae pale yellow, body and legs pale yellow to yellow; postmentum as head not darker than genae. Head capsule short oval, lateral margins widest posteriorly, converging near antennal sockets. Maximum head width minus head width at base of antennae equalling 0.02–0.05mm; margins with several short to few long setae, dorsal surface with many setae of unequal lengths, short to long, symmetrically arranged. Labrum broadly tongue-shaped, extending to beyond 0.65 length of mandibles, anterior half with 8–10 setae. Mandibles slender, slightly incurved apically, curvature 0.03–0.04mm. Antennae 13-segmented, 3rd segment smallest, 4th slightly larger, 1st longer than 2nd. Postmentum short and broad, posterior margin not v-shaped. Pronotum saddle-shaped, much narrower than head, lateral lobes scantily hairy, anterior margin with a narrow shallow median notch, posterior margin slightly concave, lateral lobes rounded posteriorly. Fore tibia weakly to moderately inflated. Fore tibial spurs three, dorsal spur as long as outer ventral spur. Single seta on fore coxa not spine-like.

Measurements (14 specimens from 7 nest series) (mm):

	Range	Mean	Type
Head length with mandibles	1.10–1.23	1.17	1.20
Head length to base of mandibles	0.70–0.75	0.68	0.75
Head width just behind antennal sockets	0.58–0.63	0.61	0.60
Maximum head width	0.60–0.68	0.64	0.64
Labrum length	0.24–0.28	0.26	0.28
Maximum labrum width	0.18–0.20	0.19	0.20
Cross length of left mandible	0.43–0.48	0.46	0.48
Mandible width	0.03–0.04	0.04	0.04
Mandible curvature	0.03–0.04	0.03	0.04
Fore tibia length	0.40–0.46	0.43	0.43
Fore tibia width	0.10–0.13	0.12	0.13
Hind tibia length	0.48–0.52	0.49	0.50
Hind tibia width	0.07–0.10	0.09	0.08
Maximum pronotum width	0.40–0.48	0.43	0.43
Postmentum length	0.33–0.40	0.38	0.38
Maximum postmentum width	0.28–0.30	0.29	0.28

MAJOR WORKER. Head capsule yellow to orange-yellow, postclypeus seating reddish brown; mandibles reddish brown, bases yellow, thoracic nota, abdomen, legs and antennae pale yellow. Head capsule subrectangular, slightly wider anteriorly, evenly rounded posteriorly; sides with many short and long setae; postmentum with several long setae; fork of epicranial suture faint; antennae 13-segmented, 3rd smallest, 4th and 5th similar, 1st and 2nd subequal. Postclypeus swollen, small squat bean-shaped with moderately distinct median suture; anteclypeus flat, medially projecting anteriorly; labrum broadly rounded. Pronotum saddle-shaped with small anterior lobes, anterior margin with shallow obtuse angular notch, posterior margin slightly concave, corners slightly rounded. Fore tibia not inflated; dorsal spur nearly as long as outer ventral spur; single large seta on anterior surface of fore coxa not spine-like.

Measurements (10 specimens from 8 nest series) (mm):

	Range	Mean
Head length to anterior margin of postclypeus	0.90–1.00	0.93
Maximum head width	0.73–0.83	0.77
Postclypeus cushion length	0.18–0.20	0.19
Postclypeus cushion width	0.30–0.31	0.30
Maximum pronotum width	0.40–0.43	0.41
Fore tibia length	0.38–0.45	0.42
Fore tibia width	0.08–0.09	0.09
Hind tibia length	0.43–0.50	0.48
Hind tibia width	0.06	0.06

BIOLOGY. Collection records refer to colonies in a dead log in woodland, a dead log in a ploughed field, from *Macrotermes* mounds and from living two-year-old eucalyptus trees.

COMPARISON. The soldier of *chomaensis* is very similar in size to that of *lounsburyi*; however the tip of the mandibles of *chomaensis* is almost straight while in *lounsburyi* the tip of the mandibles is more incurved. The worker is close to that of *alluaudanus* and *albopartitus*. It can be separated from these species by its smaller postclypeus cushion, 0.30–0.31mm compared with 0.33–0.41mm.

MATERIAL EXAMINED.

Holotype soldier: **Zambia**, Choma, 12.i.1957 (*Coaton*).

Paratype soldiers and workers, same data as holotype; and **Zambia**, Central Province of Kibise, ex Kitwe towards Dola Hill, Samfya, Choma, 31 miles ex Kitwe towards Dola Hill, 20.xii.1976, 21.i.1957, 12.i.1957, 27.i.1957, 25.i.1957, 12.i.1959 (*Bingham*).

Microtermes darlingtonae sp. n.

(Figs 73–78 soldier; 178–180 major worker; 228 distribution)

IMAGO. Unknown.

SOLDIER. Head capsule and labrum yellow; mandibles brown to reddish brown, bases yellow; postmentum as head, slightly darker than genae; antennae, thoracic nota, abdomen and legs pale yellow. Head capsule short oval, slightly longer than wide, posterior margin broadly and evenly rounded, margins with many short to few long setae, dorsal surface with many setae, short to long, symmetrically arranged. Labrum tongue-shaped, pointed at tip, anterior third with eight setae, terminal pair longest. Mandibles moderately slender, weakly to moderately incurved apically, curvature 0.03–0.05mm. Antennae 13-segmented, 3rd smallest, 4th slightly larger than 3rd, 1st and 2nd subequal. Postmentum short and broad. Pronotum saddle-shaped, anterior margin with deep v-shaped notch, posterior margin slightly concave, lateral lobes with a few long setae. Fore tibiae moderately inflated; spurs three, dorsal spur as long as outer ventral spur; long seta on coxa not spine-like.

Measurements (26 specimens, 13 nest series) (mm):

	Range	Mean	Type
Head length with mandibles	1.20–1.35	1.23	1.28
Head length to base of mandibles	0.78–0.90	0.83	0.78
Head width just behind antennal sockets	0.63–0.70	0.67	0.65
Maximum head width	0.68–0.75	0.69	0.70
Labrum length	0.28–0.30	0.29	0.30
Maximum labrum width	0.18–0.20	0.19	0.20
Cross length of left mandible	0.48–0.50	0.49	0.48
Left mandible width	0.05	0.05	0.05
Left mandible curvature	0.03–0.05	0.04	0.04
Fore tibia length	0.48–0.50	0.49	0.48
Fore tibia width	0.13–0.15	0.14	0.13
Hind tibia length	0.54–0.55	0.55	0.54
Hind tibia width	0.10	0.10	0.10
Maximum pronotum width	0.45–0.50	0.47	0.45
Postmentum length	0.38–0.43	0.41	0.43
Maximum postmentum width	0.32–0.35	0.33	0.33

MAJOR WORKER. Head capsule yellow; postclypeus seating yellow-brown; mandibles dark brown, bases yellow; antennae pale yellow; abdomen and legs yellow-white; postmentum pale yellow, paler than genae; pronotum pale yellow, slightly darker than abdomen. Head capsule squarish, sides convergent posteriorly, slightly wider in front of antennal sockets; head setae very numerous, regularly and symmetrically arranged; posterior margin broadly and evenly rounded; postclypeus swollen, squat bean-shaped, median suture faint, posterior margin not evenly rounded;

anteclypeus flat, medially projecting anteriorly; antennae 13-segmented, 3rd smallest, 4th just larger than 3rd, 1st and 2nd subequal; labrum with transverse sclerotized band, tip broadly rounded; anterior part of postmentum with 6–8 setae of varying lengths. Pronotum saddle-shaped, with small anterior lobes, anterior margin with shallow obtuse angular notch, outer corners rounded, posterior margin almost straight. Fore tibia not inflated; spurs three, dorsal spur well developed, almost as long as outer ventral spur. Fore coxa conical, single large seta on anterior surface not spine-like.

Measurements (15 specimens, 13 nest series) (mm):

	Range	Mean
Head length to anterior margin of postclypeus	0.88–0.96	0.92
Maximum head width	0.76–0.85	0.81
Postclypeus cushion length	0.18–0.20	0.19
Postclypeus cushion width	0.33–0.35	0.34
Maximum pronotum width	0.43–0.45	0.44
Fore tibia length	0.43–0.44	0.44
Fore tibia width	0.10	0.10
Hind tibia length	0.48–0.50	0.49
Hind tibia width	0.08	0.08

BIOLOGY. Collection records refer to colonies from old maize cob, rotten tree stumps, roots and stems of old maize stubble in replanted maize fields.

COMPARISON. The soldier of this species is close to that of *vadschaggae*. It can be separated from this species in that the maximum head width minus head width at base of antennae is 0.00–0.04mm, while in *vadschaggae* it is greater than 0.04mm. The worker is similar to *mulii*, *alluaudanus* and *tsavoensis*. See the keys for differentiating characters.

MATERIAL EXAMINED.

Holotype soldier: **Kenya**, Thika, near Sandmore, 25.iii.1990 (*Bacchus, Bagine*) (NMK). Paratype soldiers and workers, same data as holotype; and **Kenya**, Thika, 50, 58 and 80 kilometres from Nairobi, 25.iii.1990; Mwea, 103 kilometres from Nairobi, 23.iii.1990; Embu, 14 kilometres from town centre; Embu near Thuchi River Lodge; Meru, Tolmo; Chogoria, near Mitungu, 26.iii.1990, 27.iii.1990, 22 vials (*Bacchus, Bagine*).

Microtermes edwini sp. n.

(Figs 79–84 soldier; 181–183 major worker; 229 distribution)

IMAGO. Unknown.

SOLDIER. Head capsule and labrum yellow to pale orange; mandibles brown, bases yellow; antennae pale

yellow to yellow, sides brown, 1st segment darker; postmentum as head and genae; sides brown, thoracic nota, body and legs pale yellow. Head capsule elongate oval, posterior margin slightly rounded; head setae numerous, regularly and symmetrically arranged; labrum tongue-shaped; anterior third with three to four pairs of setae, terminal pair long, posterior shorter pairs less than half length of long pair (Fig. 82). Mandible tip slightly incurved, curvature 0.03–0.04mm. Antennae 13-segmented, 3rd smallest, just smaller than 4th, 1st and 2nd subequal. Postmentum moderately long, about one and a half times width. Pronotum saddle-shaped, anterior margin with moderately deep v-shaped notch, posterior margin straight or slightly concave. Fore tibia slightly inflated, spurs three, dorsal spur almost as long as outer ventral spur.

Measurements (15 specimens, 5 nest series) (mm):

	Range	Mean	Type
Head length with mandibles	1.40–1.50	1.44	1.43
Head length to base of mandibles	0.88–1.00	0.94	0.90
Head width just behind antennal sockets	0.68–0.73	0.69	0.68
Maximum head width	0.73–0.78	0.74	0.73
Labrum length	0.28–0.31	0.30	0.29
Maximum labrum width	0.20–0.23	0.21	0.20
Cross length of left mandible	0.51–0.53	0.52	0.53
Left mandible width	0.05–0.06	0.05	0.05
Left mandible curvature	0.03–0.04	0.04	0.03
Fore tibia length	0.45–0.48	0.46	0.46
Fore tibia width	0.10–0.13	0.12	0.10
Hind tibia length	0.53–0.55	0.54	0.53
Hind tibia width	0.09–0.10	0.10	0.09
Maximum pronotum width	0.45–0.50	0.49	0.48
Postmentum length	0.48–0.50	0.49	0.48
Maximum postmentum width	0.32–0.33	0.33	0.32

MAJOR WORKER. Head capsule yellow to orange, frons paler; labrum pale yellow to yellow; anteclypeus, antennae, abdomen and legs pale yellow to yellow; pronotum yellow always slightly darker than abdomen. Head capsule subrectangular, sides convergent posteriorly with several short setae regularly and symmetrically arranged on vertex and sides, sides with a few long setae; posterior margin broadly rounded; epicranial suture faint, postclypeus very squat bean-shaped, median suture distinct; anteclypeus medially projecting; labrum with incomplete transverse sclerotized band, tip broadly rounded; antennae 13-segmented, 3rd very small, 4th and 5th similar, 1st and 2nd subequal; postmentum with a few long hairs. Pronotum saddle-shaped with small anterior lobes, anterior margin slightly concave; posterior margin almost straight, corners rounded. Fore tibia not inflated, spurs three, dorsal spur nearly as long as ventral outer spur; fore coxa conical, single seta on anterior surface not spine-like.

Measurements (8 specimens, 4 nest series) (mm):

	Range	Mean
Head length to anterior margin of postclypeus	0.95–1.00	0.97
Maximum head width	0.75–0.80	0.78
Postclypeus cushion length	0.20–0.23	0.21
Postclypeus cushion width	0.35	0.35
Maximum pronotum width	0.43–0.45	0.44
Fore tibia length	0.43–0.45	0.44
Fore tibia width	0.10	0.10
Hind tibia length	0.49–0.50	0.50
Hind tibia width	0.08	0.08

BIOLOGY. This species has been collected from rotten *Podocarpus* logs near maize fields and from a farmer's house.

COMPARISON. The soldier of this species is grouped with *lounsburyi*, *kairoonae* and *chomaensis*. The worker is close to that of *alluaudanus*; in *edwini* the postclypeus cushion is larger with a distinct median suture; the median suture in *alluaudanus* is faint. See the keys for differentiating characters.

MATERIAL EXAMINED.
Holotype soldier: **Kenya**, Sotik, Kisabei, 13.v.1987 (*Bacchus*, *Bagine*) (NMK).
Paratype soldiers and workers, same data as holotype, 7 vials.

Microtermes etiolatus Fuller

(Figs 16–18 imago; 85–90 soldier; 184–186 major worker; 230 distribution)

Microtermes etiolatus Fuller 1922: 102. LECTOTYPE soldier: Mozambique (NCI) here designated [examined].

IMAGO. Head capsule orange-yellow to orange, stippled with many minute, pale dots at bases of setae; medial spot, anteclypeus and antennae pale yellow, first two antennal segments darker, sides brown; postclypeus, labrum, body and legs yellow; pronotum distinctly paler than head capsule. Posterior margin of head capsule arcuate and evenly rounded; numerous setae above eyes and a few behind eyes, setae not extending beyond bulge of eyes; fontanelle absent; median spot oval; fork of epicranial suture not touching ocellus, stem incomplete. Frons smooth; postclypeus shield-shaped with distinct median suture. Eyes and ocelli oval; ocelli not touching eyes; labrum shorter than wide; antennae 15-segmented, 3rd and 4th the smallest segments, about same size, 1st, 2nd and 5th subequal. Pronotum with many setae; without a pallid cross, anterior and posterior margin slightly concave; mesonotum and metanotum without

median line, posterior margin moderately concave. Wings extending beyond body to about 0.6 length of abdomen.

Measurements (8 specimens from 5 nest series) (mm):

	Range	Mean
Head length to anterior margin of postclypeus	1.20–1.22	1.19
Head width across eyes	1.30–1.40	1.34
Postclypeus length	0.31–0.35	0.33
Postclypeus width	0.60–0.65	0.63
Labrum length	0.30–0.38	0.34
Maximum labrum width	0.50–0.53	0.51
Maximum diameter of eye	0.40–0.45	0.42
Minimum diameter of eye	0.38–0.40	0.39
Maximum diameter of ocellus	0.20	0.20
Minimum diameter of ocellus	0.13–0.15	0.14
Distance of ocellus to eye	0.03–0.05	0.03
Pronotum length	0.83–0.93	0.88
Maximum pronotum width	1.25–1.28	1.26
Hind tibia length	1.33–1.45	1.38

SOLDIER. Head capsule yellow; labrum yellow to dark yellow; antennae, body and legs pale yellow; mandibles reddish brown, bases yellow; postmentum yellow, as genae. Head capsule elongately rectangular, posterior margin slightly and evenly rounded, widest posteriorly, converging just behind antennal sockets. Head laterally with many seta, regularly and symmetrically arranged. Labrum tongue-shaped with 9/10 setae. Mandibles robust, inner region of left mandible finely serrated, tips slightly incurved. Antennae 13-segmented, 3rd segment very small, 4th and 5th similar, 1st and 2nd subequal. Pronotum saddle-shaped, much narrower than head, anterior margin with moderate median v-shaped notch, posterior margin almost straight, corners rounded. Fore tibia slightly inflated; spurs three, dorsal spur nearly as long as outer ventral spur. Single large seta on coxa not spine-like.

Measurements (6 specimens from 5 nest series) (mm):

	Range	Mean	Type
Head length with mandibles	1.40–1.58	1.51	1.53
Head length to base of mandibles	0.89–1.03	1.01	1.03
Head width just behind antennal sockets	0.67–0.78	0.70	0.70
Maximum head width	0.69–0.80	0.74	0.75
Labrum length	0.26–0.30	0.28	0.26
Maximum labrum width	0.20–0.28	0.24	0.20
Cross length of left mandible	0.55–0.58	0.56	0.55
Left mandible width	0.06–0.09	0.08	0.08
Left mandible curvature	0.03–0.05	0.04	0.04
Fore tibia length	0.50–0.55	0.51	0.50
Fore tibia width	0.11–0.13	0.12	0.13
Hind tibia length	0.55–0.63	0.58	0.55
Hind tibia width	0.09–0.11	0.10	0.10

Maximum pronotum width	0.48–0.53	0.49	0.45
Postmentum length	0.58–0.63	0.59	0.63
Maximum postmentum width	0.33–0.38	0.35	0.35

MAJOR WORKER. Head capsule yellow to orange-yellow; postclypeus seating reddish brown; mandibles reddish brown, bases yellow; body, legs and antennae pale yellow. Head capsule subrectangular, sides almost parallel, head setae numerous, regularly and symmetrically arranged, posterior margin broadly and evenly rounded. Fork of epicranial suture faint. Postclypeus small, squat bean-shaped, swollen, with distinct median suture. Antennae 13-segmented, 3rd smallest, 4th and 5th similar, 1st and 2nd subequal. Pronotum saddle-shaped with small anterior lobes, anterior margin slightly concave, posterior margin almost straight. Fore tibiae not inflated. Spurs three; dorsal spurs on fore tibiae about half length of outer ventral spurs. Single long seta on anterior surface of fore coxa not spine-like.

Measurements (2 workers, 1 nest series) (mm):

	Range	Mean
Head length to anterior margin of postclypeus	1.03–1.05	1.04
Maximum head width	0.88–0.95	0.92
Postclypeus cushion length	0.23–0.25	0.24
Postclypeus cushion width	0.38–0.40	0.36
Maximum pronotum width	0.50	0.50
Fore tibia length	0.55	0.55
Fore tibia width	0.10	0.10
Hind tibia length	0.68	0.68
Hind tibia width	0.10	0.10

BIOLOGY. Collection records refer to colonies from mounds of *Odontotermes* and *Macrotermes*.

COMPARISON. See under *albopartitus*.

MATERIAL EXAMINED.

Lectotype soldier: **Mozambique**, 18.xii.1918 (*Fuller*) (NCI).

Other material: **Zambia**, Malaika, Lusaka, Chakwenga, 15.xi.1969, 5.x.1968, 31.x.1970, 5 vials (*Bingham*) (*Coaton*).

Microtermes kairoonae sp.n

(Figs 115–120 soldier; 187–189 major worker; 231 distribution)

IMAGO. Unknown.

SOLDIER. Head capsule pale yellow to pale orange, labrum pale yellow to yellow; mandibles brown to reddish brown, bases yellow; antennae pale yellow, first segment darker, postmentum and genae as head; thoracic nota and abdomen yellow-white to yellow;

legs pale yellow to yellow. Head capsule short oval; sides convergent anteriorly, much broader posteriorly; head setae very numerous, regularly and symmetrically arranged; labrum tongue-shaped, anterior third with three pairs of setae, terminal pair long, posterior pairs very short, less than half length of long pair. Mandibles slightly incurved at tips, curvature 0.03mm. Antennae 13-segmented, 3rd the smallest segment, just smaller than 4th; 1st and 2nd subequal; postmentum short and broad. Pronotum saddle-shaped, narrower than head, anterior margin with broad shallow v-shaped notch in middle, posterior margin almost straight. Fore tibia slightly inflated. Spurs three, dorsal spur more than 0.5 length of outer ventral spur. Single large seta on fore coxa not spine-like.

Measurements (10 specimens, 5 nest series) (mm):

	Range	Mean	Type
Head length with mandibles	1.18–1.20	1.19	1.20
Head length to base of mandibles	0.75–0.80	0.78	0.78
Head width just behind antennal sockets	0.60–0.63	0.62	0.61
Maximum head width	0.65–0.68	0.66	0.66
Labrum length	0.25–0.28	0.27	0.25
Maximum labrum width	0.18–0.23	0.20	0.20
Cross length of left mandible	0.45–0.48	0.46	0.46
Mandible width	0.04	0.04	0.04
Mandible curvature	0.03	0.03	0.03
Fore tibia length	0.40–0.45	0.42	0.43
Fore tibia width	0.10–0.11	0.10	0.11
Hind tibia length	0.45–0.48	0.46	0.48
Hind tibia width	0.09–0.10	0.09	0.09
Maximum pronotum width	0.40–0.45	0.43	0.41
Postmentum length	0.40–0.43	0.42	0.41
Maximum postmentum width	0.28–0.30	0.29	0.29

MAJOR WORKER. Head capsule pale yellow to yellow; body, legs, antennae and labrum pale yellow; postclypeus as head; postclypeus seating yellow-brown. Head capsule subrectangular, with numerous setae, regularly and symmetrically arranged; posterior margin broadly and evenly rounded; postclypeus small, squat bean-shaped, median suture moderately distinct; fork of epicranial suture incomplete; antennae 13-segmented, 3rd smallest, 4th and 5th similar, 1st and 2nd subequal, labrum tip broadly rounded, transverse sclerotized band incomplete; postmentum with a few long setae. Pronotum narrower than head, anterior margin slightly concave, posterior margin almost straight. Fore tibia not inflated; spurs three, dorsal spur just more than half length of ventral outer spur. Fore coxa conical, single large seta on anterior surface not spine-like.

Measurements (6 specimens, 3 nest series) (mm):

	Range	Mean
Head length to anterior margin of postclypeus	0.90–0.91	0.90
Maximum head width	0.73–0.73	0.74
Postclypeus cushion length	0.18–0.20	0.20
Postclypeus cushion width	0.33–0.35	0.34
Maximum pronotum width	0.40–0.43	0.41
Fore tibia length	0.38–0.43	0.40
Fore tibia width	0.08–0.09	0.08
Hind tibia length	0.43–0.45	0.44
Hind tibia width	0.06–0.08	0.07

BIOLOGY. Specimens were collected from their fungus combs in the nests of *Macrotermes* and *Pseudacanthotermes* and under logs in farmlands with maize, sorghum and sugarcane. In Kajulu, Kisumu, where this species was collected by the author, farmers complained that termites were destroying their crops and houses.

COMPARISON. The soldier of this species is very close to that of *chomaensis* and *cheberensis*. The head of *kairoonae* is pear-shaped and broadly rounded behind, while in *chomaensis* the head is short and oval. In *cheberensis*, the head is elongately oval and the mandibles are straighter at the tip than in *kairoonae*. The worker is near to *magnocellus*. See the keys for differentiating characters.

MATERIAL EXAMINED.

Holotype soldier: **Kenya**, Kisumu, Chulaimbo, 23.v.1985 (*Bacchus, Bagine*) (NMK). Paratypes, data as holotype and 2 vials: **Kenya**, Kajulu, 25.v.1987 (*Bacchus, Bagine*); Kakamega, Vihiga, 25.v.1987 (*Bacchus, Bagine*).

Microtermes logani sp. n.

(Figs 121–126 soldier; 190–192 major worker; 232 distribution)

IMAGO. Unknown.

SOLDIER. Head capsule yellow to pale orange; labrum paler than head; antennae, pronotum, abdomen and legs yellow-white to pale yellow; mandibles reddish brown, bases yellow; postmentum yellow to pale orange, darker than genae. Head capsule elongate oval, widest posteriorly, converging near antennal sockets; head setae numerous, regularly and symmetrically arranged; labrum broad tongue-shaped, anterior half with 8 setae. Mandibles thick, moderately to strongly incurved apically, Antennae 14-segmented, 3rd the smallest segment, just smaller than 4th, 1st and 2nd subequal; postmentum moderately long and broad. Pronotum saddle-shaped, lobes with many setae, anterior lobes divided by a moderately deep median V-shaped notch, posterior lobe large, semicircular, margin slightly concave. Fore tibia moderately in-

flated, spurs three, dorsal spur more than 0.5 length of ventral outer spur. Single long seta on fore coxa not spinelike.

Measurements (4 specimens from two nest series) (mm):

	Range	Mean	Type
Head length with mandibles	1.53–1.55	1.55	1.53
Head length to base of mandibles	1.02–1.03	1.03	1.02
Head width just behind antennal sockets	0.80–0.83	0.82	0.80
Maximum head width	0.83–0.87	0.86	0.83
Labrum length	0.30–0.33	0.32	0.30
Maximum labrum width	0.26–0.28	0.27	0.26
Cross length of left mandible	0.58–0.60	0.59	0.60
Mandible width	0.08–0.09	0.08	0.08
Mandible curvature	0.08	0.08	0.08
Fore tibia length	0.55–0.60	0.59	0.55
Fore tibia width	0.15	0.15	0.15
Hind tibia length	0.70	0.70	0.70
Hind tibia width	0.10	0.10	0.10
Maximum pronotum width	0.55	0.55	0.55
Postmentum length	0.53–0.58	0.57	0.53
Maximum postmentum width	0.35–0.38	0.35	0.38

MAJOR WORKER. Head capsule yellow; mandibles brown, bases yellow; antennae, postclypeus seating, pronotum, legs and abdomen pale yellow. Head capsule subrectangular, sides nearly parallel, posterior margin broadly and evenly rounded, head setae numerous, regularly and symmetrically arranged; epicranial suture absent, postclypeus swollen, thin bean-shaped, with faint medial suture, anteclypeus flat, slightly projecting medially; labrum with incomplete transverse sclerotized band, tip broadly rounded; antennae 14-segmented, 3rd and 4th similar, slightly smaller than 5th, 1st and 2nd subequal. Pronotum saddle-shaped with small anterior lobes, anterior median margin shallowly V-shaped, outer corners rounded, posterior margin almost straight. Fore tibia not inflated, fore coxa conical, large seta on anterior surface not spine-like, spurs three, dorsal spur well developed, almost as long as outer ventral spur.

Measurements (4 specimens from 2 nest series) (mm):

	Range	Mean
Head length to anterior margin of postclypeus	1.02–1.05	1.04
Maximum head width	0.90–0.94	0.92
Postclypeus cushion length	0.20–0.23	0.22
Postclypeus cushion width	0.37–0.38	0.37
Maximum pronotum width	0.50	0.50
Fore tibia length	0.50	0.50
Fore tibia width	0.10	0.10
Hind tibia length	0.58–0.60	0.59
Hind tibia width	0.07	0.07

BIOLOGY. Specimens were collected on a dead tree stump in Zomba and on farm land in Mobezi.

COMPARISON. Soldiers and workers of this species are grouped with *lokoriensis*, *redenianus*, *luteus* and *pamelae* as they all have antennae with 14 segments. See the keys for differentiating characters.

MATERIAL EXAMINED.

Holotype soldier: **Malawi**, Zomba, 3.xi.1990 (*Logan*).

Paratypes, soldiers and workers, data as holotype; and **Malawi**, Mobezi, 4. xi.1990 (*Logan*).

Microtermes lokoriensis sp.n

(Figs 127–132 soldier; 193–195 major worker; 233 distribution)

IMAGO. Unknown.

SOLDIER. Head capsule and labrum yellow to orange; mandibles brown, bases yellow; antennae, body and legs pale yellow; postmentum as head, slightly darker than genae. Head elongately rectangular, sparsely hairy, sides parallel or convergent anteriorly or posteriorly, posterior margin evenly rounded; labrum short, extending to about middle of mandible, broadly tongue-shaped, tip rounded, anterior third with 5–8 setae; mandibles long, tip strongly curved upwards, inner margins finely serrated, curvature 0.08–0.10mm; inner margin of left mandible with a small tooth; antennae 14-segmented, 3rd and 4th similar, 1st and 2nd subequal. Postmentum very long and narrow. Pronotum saddle-shaped, anterior margin with obtuse angular notch in middle, posterior margin slightly concave. Fore tibia moderately inflated; spurs three, dorsal spur about same length as outer ventral spur; single seta on fore coxa not spine-like.

Measurements (15 specimens from 13 nest series) (mm):

	Range	Mean	Type
Head length with mandibles	1.60–1.90	1.73	1.73
Head length to base of mandibles	1.00–1.23	1.11	1.08
Head width just behind antennal sockets	0.75–0.85	0.80	0.80
Maximum head width	0.75–0.85	0.81	0.83
Labrum length	0.28–0.33	0.30	0.23
Maximum labrum width	0.25–0.28	0.26	0.25
Cross length of left mandible	0.65–0.75	0.69	0.70
Left mandible width	0.08–0.10	0.09	0.08
Left mandible curvature	0.08–0.10	0.09	0.10
Fore tibia length	0.58–0.65	0.61	0.60
Fore tibia width	0.13–0.15	0.14	0.14
Hind tibia length	0.63–0.73	0.70	0.70
Hind tibia width	0.10–0.13	0.11	0.10
Maximum pronotum width	0.50–0.63	0.56	0.53
Postmentum length	0.63–0.85	0.70	0.70
Maximum postmentum width	0.33–0.35	0.34	0.35

MAJOR WORKER. Head capsule yellow to yellow-brown, postclypeus seating reddish brown; mandibles brown, bases pale yellow. Head capsule subrectangular, sides convergent posteriorly, posterior margin broadly rounded; head setae regularly and symmetrically arranged; fork of epicranial suture present; postclypeus swollen, thin bean-shaped, median suture moderately distinct; anteclypeus flat, medially projecting anteriorly; antennae 14-segmented, 4th the smallest, 3rd and 5th similar, 1st and 2nd subequal; labrum with transverse sclerotized band, tip broadly rounded. Pronotum saddle-shaped, anterior margin shallowly concave in middle, posterior margin straight, corners slightly rounded. Fore tibia not inflated; spurs three, dorsal spur about half length of outer ventral spur. Fore coxa conical, large seta on anterior surface not spine-like.

Measurements (10 specimens from 6 nest series) (mm):

	Range	Mean
Head length to anterior margin of postclypeus	0.98–1.13	1.04
Maximum head width	0.85–0.95	0.90
Postclypeus cushion length	0.18–0.23	0.20
Postclypeus cushion width	0.35–0.39	0.36
Maximum pronotum width	0.45–0.53	0.48
Fore tibia length	0.50–0.55	0.53
Fore tibia width	0.08–0.10	0.09
Hind tibia length	0.60–0.68	0.63
Hind tibia width	0.08–0.09	0.08

BIOLOGY. Collection records refer to colonies in dead wood and in and under a dead stump, mainly in *Acacia tortilis* thickets.

COMPARISON. The soldier of this species is distinct in having the longest mandible among *Microtermes*, 0.65–0.75mm compared with 0.50–0.61mm. The antennae are 14-segmented a feature also found in *redenianus*, *pamelae* and *luteus*. The worker is grouped also with *luteus*, *pamelae* and *redenianus*. See the keys for differentiating characters.

MATERIAL EXAMINED.

Holotype soldier: **Kenya**, Lokori, 9.vii.1969 (*Sands*) (NMK).

Paratype soldiers and workers same data as holotype; and **Kenya**, Lokori, Laferu, Kanget Road, Nasulu, Inyang-yangi road, Lokwamuthing, 24.vii.1969, 15.vii.1969, 13.vii.1969, 24.viii.1969, 26.viii.1969, 23.vii.1969, 27.viii.1969, 12.vii.1969 (*Sands*); Eliye Springs, no date (*Collins*).

Microtermes lounsburyi Fuller

(Figs 19–21 imago; 133–138 soldier; 196–198 major worker; 234 distribution)

Microtermes lounsburyi Fuller 1922: 99. LECTOTYPE imago: South Africa (NCI) here designated [examined].

IMAGO. Head orange-yellow to orange, stippled with many pale dots at bases of setae; anteclypeus pale yellow; postclypeus pale yellow to yellow; antennal segments yellow, sides brown; first and second segments darker; labrum yellow; pronotum usually slightly paler than head capsule; abdominal tergites yellow-brown, sternites slightly paler; tibiae yellow, slightly darker than femora. Posterior region of head capsule almost a semicircle. Head with many setae above eyes and fewer behind eyes, not extending beyond bulge of eyes. Fontanelle not visible; median spot oval. Frons smooth. Epicranial suture incomplete. Eyes and ocelli oval; postclypeus with pronounced median suture. Labrum broader than long; antennae 15-segmented, 3rd the smallest segment, 2nd and 4th about same size, 1st larger. Pronotum hairy, with white pallid cross, anterior and posterior margins slightly emarginate. Mesonotum and metanotum with moderate incurved hind margins. Wings extending to less than half length of body and head.

Measurements (6 specimens, 5 nest series) (mm):

	Range	Mean	Type
Head length to anterior margin of postclypeus	1.03–1.08	1.06	1.08
Head width across eyes	1.10–1.23	1.17	1.18
Postclypeus length	0.28–0.30	0.29	0.30
Postclypeus width	0.54–0.57	0.55	0.55
Labrum length	0.25–0.33	0.30	0.30
Maximum labrum width	0.43–0.45	0.44	0.45
Maximum diameter of eye	0.33–0.40	0.36	0.33
Minimum diameter of eye	0.28–0.35	0.31	0.28
Maximum diameter of ocellus	0.13–0.15	0.14	0.13
Minimum diameter of ocellus	0.08–0.13	0.11	0.08
Distance ocellus to eye	0.03–0.05	0.04	0.05
Maximum pronotum length	0.65–0.75	0.71	0.70
Maximum pronotum width	1.05–1.15	1.11	1.05
Hind tibia length	1.15–1.25	1.19	1.15

SOLDIER. Head capsule and labrum yellow to orange-yellow; mandibles brown, bases yellow; antennae pale yellow, first and second segments slightly darker; postmentum yellow, as genae; thoracic nota, abdomen and legs pale yellow. Head capsule short oval, laterally with many regularly and symmetrically arranged setae; posterior margin evenly rounded. Labrum tongue-shaped, tip reaching beyond middle of mandibles and with 8 to 10 setae. Mandibles almost straight, curvature 0.04mm. Antennae 13-segmented, 3rd the smallest, 1st and 2nd subequal. Postmentum short and broad. Pronotum anterior margin slightly concave, posterior margin almost straight. Fore tibia not inflated; spurs three, dorsal spur nearly as long as ventral

outer spur; large seta on anterior surface of fore coxa not spine-like.

Measurements (4 specimens from 4 nest series) (mm):

	Range	Mean
Head length with mandibles	1.15–1.23	1.19
Head length to base of mandibles	0.75–0.80	0.78
Head width just behind antennal sockets	0.58–0.65	0.59
Maximum head width	0.60–0.68	0.63
Labrum length	0.20–0.25	0.24
Maximum labrum width	0.18–0.20	0.19
Cross length of left mandible	0.45–0.48	0.46
Left mandible width	0.05–0.06	0.05
Left mandible curvature	0.04	0.04
Fore tibia length	0.45	0.45
Fore tibia width	0.10–0.13	0.11
Hind tibia length	0.53–0.55	0.54
Hind tibia width	0.09	0.09
Maximum pronotum width	0.40–0.45	0.43
Postmentum length	0.40	0.40
Maximum postmentum width	0.30	0.30

MAJOR WORKER. Head capsule yellow; antennae, body and legs pale yellow; postclypeus seating distinctly yellow-brown. Head capsule subrectangular, sides nearly parallel; posterior margin broadly rounded; sides scantily hairy; fork of epicranial suture incomplete; postclypeus swollen, very squat bean-shaped, with distinct median suture, anteclypeus flat, medially projecting. Antennae 13-segmented, 3rd just smaller than 4th, 1st and 2nd subequal; postmentum with a few long setae; labrum with incomplete transverse sclerotized band, tip broadly rounded. Pronotum saddle-shaped, anterior median margin with broad shallow v-shaped notch, posterior margin almost straight. Fore tibia not inflated; single seta on anterior surface of fore coxa not spine-like; dorsal spur almost same length as ventral spur.

Measurements (4 specimens from 4 nest series) (mm):

	Range	Mean
Head length to anterior margin of postclypeus	0.88–0.93	0.91
Maximum head width	0.73–0.78	0.76
Postclypeus cushion length	0.18–0.21	0.20
Postclypeus cushion width	0.33–0.35	0.34
Maximum pronotum width	0.40–0.45	0.42
Fore tibia length	0.40–0.45	0.43
Fore tibia width	0.08–0.09	0.09
Hind tibia length	0.45–0.50	0.49
Hind tibia width	0.06	0.06

BIOLOGY. *M. lounsburyi* was originally described from bushveld at Pienaars River, Transvaal, South

Africa, where it was found in the same field as *etiolatus*. [Editor's note: this statement may be an error: *etiolatus* (q.v.) appears not to be known from South Africa.] Collecting records refer to colonies from *Macrotermes* mounds and from underground nests.

COMPARISON. The imago of *lounsburyi* is near to that of *mulii* and *baginei*. The soldier is near to *edwini*, *kairoonae* and *chomaensis*. The worker is close to *darlingtonae*. See the keys for differentiating characters.

MATERIAL EXAMINED.

Lectotype imago: **South Africa**, Transvaal, Pienaars River (*Fuller*) (NCI).

Paralectotype imagos, same data as lectotype.

Other material: **Zimbabwe**, Rekomitjie, 23.xi.1965, 14.x.1960 (*Bingham*); 25 mls North West of Gokwe, 19.xi.1962 (*Bingham*); **Zambia**, Lusaka, Libala, 16.xi.1969 (*Bingham*).

Microtermes luteus Harris

(Figs 22–24 imago; 91–96 soldier; 199–201 major worker; 235 distribution)

Microtermes luteus Harris, 1954: 132–143. Holotype soldier: **Tanzania** (BMNH) [examined].

IMAGO. Head capsule orange-brown, stippled with many large and small yellow dots at bases of setae, frons paler; medial spot, labrum and pronotum yellow, distinctly paler than head, tibiae and tarsi yellow; antennae and tergites yellow, sometimes slightly paler than pronotum, sides of antennae brown, 1st and 2nd segments darker than other segments; anteclypeus yellow-white; sternites, coxae and femur pale yellow; wings pale yellow, anterior veins yellow-brown. Posterior margin of head capsule arcuate and evenly rounded; numerous setae above eyes, fewer setae behind eyes, longest setae sometimes reaching to almost outer curvature of eyes. Low ridge extending from medial spot to near posterior of postclypeus. Fontanelle narrowly oval, slightly depressed in front of a line joining posterior region of eye. Median spot oval. Stem of epicranial suture clearly visible, v indistinct. Postclypeus long bean-shaped, much longer than wide, with weak to moderately bold median line. Eyes short oval, ocelli elongately oval; labrum shorter than wide, disc with several hairs; antennae 16-segmented, 1>2, 3, 4 and 5 equal in size and smaller than 1 and 2. Pronotum densely pilose, almost as wide as head capsule; anterior margin moderately emarginate, posterior margin straight; mesonotum and metanotum with deep, broad v-shaped hind margins, median line incomplete, tibia and tarsi darker than coxae and femora.

Measurements (6 specimens from 2 nest series) (mm):

	Range	Mean
Head length to anterior margin of postclypeus	1.15–1.25	1.21
Head width across eyes	1.25–1.33	1.29
Postclypeus length	0.29–0.30	0.29
Postclypeus width	0.63	0.63
Labrum length	0.38–0.40	0.39
Maximum labrum width	0.48–0.53	0.50
Maximum diameter of eye	0.35–0.40	0.38
Minimum diameter of eye	0.33–0.38	0.35
Maximum diameter of ocellus	0.18–0.20	0.19
Minimum diameter of ocellus	0.13	0.13
Distance ocellus to eye	0.03–0.04	0.03
Pronotum length	0.80–0.90	0.87
Maximum pronotum width	1.18–1.25	1.23
Hind tibia length	1.38–1.43	1.40

SOLDIER. Head capsule yellow, pale orange to orange; labrum yellow, dark yellow to orange; mandibles brown, bases yellow; antennae pale yellow, sides brown; postmentum yellow, as genae; thoracic nota, abdomen and legs pale yellow to yellow. Head capsule oval, slightly narrower anteriorly and hairy; labrum tongue-shaped, tip reaching beyond middle of mandibles, dorsal surface very hairy (unlike the other species described here); mandible tips strongly curved inwards, curvature 0.06–0.09mm; antennae 14-segmented, 3rd and 4th similar, slightly smaller than 5th, 1>2, 2>3; postmentum short and broad. Pronotum with small pointed anterior lobes divided by v-shaped median notch; posterior lobes large, semicircular, with slightly concave margin. Fore tibia wide, 0.13–0.15mm, slightly inflated ventrally. Spurs three, dorsal spur almost as long as ventral outer spur; single seta on anterior surface of coxa spine-like.

Measurements (18 specimens, 14 nest series) (mm):

	Range	Mean	Type
Head length with mandibles	1.40–1.63	1.49	1.50
Head length to base of mandibles	0.90–1.04	0.96	0.95
Head width just behind antennal sockets	0.74–0.95	0.80	0.78
Maximum head width	0.83–1.00	0.87	0.88
Labrum length	0.30–0.35	0.33	0.33
Maximum labrum width	0.23–0.28	0.25	0.25
Cross length of left mandible	0.58–0.61	0.59	0.60
Left mandible width	0.06	0.06	0.06
Mandible curvature	0.06–0.09	0.07	0.09
Fore tibia length	0.55–0.63	0.59	0.60
Fore tibia width	0.13–0.15	0.14	0.15
Hind tibia length	0.70–0.78	0.73	0.73
Hind tibia width	0.09–0.11	0.10	0.10
Maximum pronotum width	0.54–0.60	0.57	0.58
Postmentum length	0.43–0.52	0.47	0.50
Maximum postmentum width	0.37–0.43	0.40	0.43

MAJOR WORKER. Head capsule yellow; antennae pale yellow, body and legs yellow-white; postclypeus seating reddish brown. Head capsule squarish, sides convergent posteriorly, posterior margin broadly rounded; head setae numerous, regularly and symmetrically arranged; fork of epicranial suture sometimes present; postclypeus swollen, thin bean-shaped, median suture faint, anteclypeus flat, medially projecting anteriorly; antennae 14-segmented, 3rd and 4th similar, 1st and 2nd subequal; postmentum with a few long setae. Pronotum saddle-shaped, anterior margin with obtuse angular notch, posterior margin almost straight. Fore tibia not inflated; spurs three; dorsal spur about same length as outer ventral spur; fore coxa conical, anterior surface with a spine-like seta.

Measurements (10 specimens from 5 nest series) (mm):

	Range	Mean
Head length to anterior margin of postclypeus	1.15–1.23	1.18
Maximum head width	1.03–1.13	1.08
Postclypeus cushion length	0.18–0.23	0.21
Postclypeus cushion width	0.38–0.45	0.42
Maximum pronotum width	0.53–0.63	0.58
Fore tibia length	0.60–0.63	0.61
Fore tibia width	0.08–0.10	0.09
Hind tibia length	0.73–0.78	0.75
Hind tibia width	0.07–0.08	0.08

BIOLOGY. Collection records refer to colonies from the mounds of *Macrotermes*, from dead plant material in *Acacia* and *Cordia* thickets, and in cultivated areas from the roots and stems of old standing maize stubble. The previously undescribed alates were found by the author swarming from small holes in the ground at 19:15 h at Lake Baringo, Kenya.

COMPARISON. The imago of this species is close to that of *redenianus*. The soldier is near to *pamelae*. The worker is similar to a number of species, but easily identifiable by its long hind tibia, 0.73–0.78mm compared with 0.55–0.70mm. See the keys for differentiating characters.

MATERIAL EXAMINED.

Holotype soldier: **Tanzania**, Kitivo, 19.v.1952 (*Kemp*) (BMNH).

Paratype imagos, soldiers and workers, same data as holotype.

Other material: **Tanzania**, Mwakijembe, 12.ii.1982 (*Kemp*); **Kenya**, nr Hola, Malindi, Tsavo National Park, Mtito Andei, Firori, Voi, 3 mls from Town Centre on road side to Nairobi, Likori, Lake Baringo, 12.vii.1984, 8.viii.1950, 28.x.1988, 12.ii.1982, 26.xi.1964, 23.vi.1969, 4.iv.1990 (*Kemp*) (*Sands*) (*Bacchus*, *Bagine*).

Microtermes magnocellus (Sjöstedt)

(Figs 31–33 imago; 97–102 soldier; 202–204 major worker; 236 distribution)

Termes (*Microtermes*) *magnocellus* Sjöstedt, 1915: 16–18. Paratype imago, **Tanzania** (AMNH) [examined].

IMAGO. Head capsule pale orange-yellow stippled with many large and small pale yellow dots at base of hairs; fontanelle pale yellow; anteclypeus yellow-white; postclypeus, labrum, antennae, body and legs pale yellow. Pronotum distinctly paler than head capsule. Wings yellow-white, anterior veins slightly darker. Posterior margin of head capsule arcuate and evenly rounded; head with several setae above eyes, very few setae behind eyes; fontanelle oval; epicranial suture faint; frons smooth. Eyes oval; ocelli close to eyes, nearly round; median suture on postclypeus distinct; labrum shorter than wide; antennae 15-segmented, 3rd the smallest segment, 1st, 2nd and 4th subequal. Pronotum with many setae, without a pallid cross; anterior and posterior margins slightly emarginate; mesonotum and metanotum without median line, posterior margins deeply emarginate. Wings very long, extending beyond body by about length of abdomen.

Measurements (5 specimens, 3 nest series) (mm):

	Range	Mean	Type
Head length to anterior margin of postclypeus	1.02–1.08	1.05	1.08
Head width across eyes	1.15–1.20	1.18	1.20
Postclypeus length	0.30–0.31	0.30	0.30
Postclypeus width	0.54–0.55	0.54	0.55
Labrum length	0.30–0.33	0.32	0.33
Maximum labrum width	0.39–0.43	0.40	0.39
Maximum diameter of eye	0.40–0.43	0.41	0.43
Minimum diameter of eye	0.35–0.38	0.37	0.35
Maximum diameter of ocellus	0.15–0.20	0.18	0.20
Minimum diameter of ocellus	0.12–0.16	0.15	0.16
Distance ocellus to eye	0.03	0.03	0.03
Maximum pronotum length	0.73–0.75	0.74	0.73
Maximum pronotum width	1.05–1.10	1.08	1.10
Hind tibia length	1.18–1.25	1.20	1.18

SOLDIER. Head capsule pale yellow to orange; mandibles reddish brown, bases pale yellow; labrum as head capsule; antennae, body and legs yellow-white, pale yellow to orange-yellow. Head capsule subrectangular, sides parallel or convergent anteriorly or posteriorly; labrum tongue-shaped, length variable, tip with 2 or 3 pairs of setae; terminal pair longest. Mandibles incurved apically, curvature 0.04–0.05mm. Antennae with 12 segments, segment 1>2, 2 slightly longer than 3, 3, 4 and 5 nearly same size. Postmentum long and narrow, 0.55–0.62mm. Pronotum narrower than maximum head width, anterior margin in middle

with moderate to deep v-shaped notch, posterior margin almost straight to slightly concave. Fore tibia hardly inflated. Spurs three, dorsal spur almost as long as outer ventral spur; single large seta on coxa not spine-like.

Measurements (38 specimens, 19 nest series) (mm):

	Range	Mean
Head length with mandibles	1.38–1.58	1.40
Head length to base of mandibles	0.93–1.10	1.02
Head width just behind antennal sockets	0.63–0.73	0.68
Maximum head width	0.60–0.76	0.68
Labrum length	0.18–0.28	0.23
Maximum labrum width	0.18–0.23	0.20
Cross length of left mandible	0.50–0.55	0.53
Left mandible width	0.06–0.08	0.07
Left mandible curvature	0.04–0.05	0.05
Fore tibia length	0.43–0.51	0.44
Fore tibia width	0.10–0.13	0.11
Hind tibia length	0.48–0.50	0.49
Hind tibia width	0.08–0.10	0.09
Maximum pronotum width	0.41–0.50	0.45
Postmentum length	0.55–0.62	0.58
Maximum postmentum width	0.28–0.32	0.29

MAJOR WORKER. Head capsule yellow to pale orange; postclypeus seating yellow-brown; mandibles brown, bases yellow; postclypeus seating yellow-brown, antennae, body and legs pale yellow. Head capsule subrectangular, much longer than broad; sides convergent behind, head setae numerous, regularly and symmetrically arranged; posterior margin broadly and evenly rounded; postclypeus very squat bean-shaped with distinct median suture; postmentum with several setae; labrum with incomplete sclerotized band, tip broadly rounded; antennae 13-segmented, 3rd smallest, 4th and 5th similar, 1st and 2nd subequal. Pronotum anterior margin with shallow and broad v-shaped median notch; posterior margin straight. Fore tibia not inflated; dorsal spur about same length as outer ventral spur; single long seta on anterior surface of fore coxa not spine-like.

Measurements (12 specimens from 7 nest series) (mm):

	Range	Mean
Head length to anterior margin of postclypeus	0.88–0.91	0.90
Maximum head width	0.70–0.75	0.72
Postclypeus cushion length	0.20–0.23	0.21
Postclypeus cushion width	0.30–0.35	0.32
Maximum pronotum width	0.40–0.43	0.42
Fore tibia length	0.40–0.41	0.40
Fore tibia width	0.09	0.09
Hind tibia length	0.43–0.45	0.44
Hind tibia width	0.08	0.08

BIOLOGY. *M. magnocellus* is recorded in Tanzania, Malawi and Zambia but not in Kenya, in spite of extensive collecting by the author in the latter country (Table 1). It is found in bushland, forest and cultivated areas. The collections examined refer to colonies in roots of *P. patula*, in rotten branches of trees, in dead wood and from fungus combs in nests of *Odontotermes*, *Cubitermes* and *Macrotermes*.

COMPARISON. The alate of this species is close to that of *vadschaggae*. The soldier is near to *alluaudanus*, *etiolatus* and *albopartitus*. The worker is similar to *kairoonae*. See the keys for differentiating characters.

MATERIAL EXAMINED.

Paratype imago, **Tanzania**, Usambara (AMNH). Other material: **Tanzania**, Amani, Ngua, East Usambara, ix.1951, 27.iv.1952, 27.iii.1953, 3.ii.1952, 3.iv.1952 (*Sweeney*) (*Kemp*); **Zambia**, Choma, Chichele Forest Research Station, 15 miles from Kitwe, Mbala-Kasama, near Ndola, Kalambo Falls (*Coaton*) (*Bingham*); **Malawi**, Songwe, near Lilongwe, Milange, 2 miles from Bilala, 5 miles from Limbe on Zomba Road, 6.5 miles E of Milange (*Sands, Wilkinson*).

Microtermes mariae sp.n

(Figs 25–27 imago; 103–108 soldier; 205–207 major worker; 237 distribution)

IMAGO. Head capsule orange, brownish above ocelli and fork of epicranial suture; frons and genae paler, head stippled with many large and small yellow dots at bases of setae; anteclypeus yellow-white, postclypeus yellow, antennae pale yellow; pronotum yellow, distinctly paler than head; legs pale yellow; tergites and sternites pale yellow; wings yellow, anterior veins darker. Posterior region of head capsule arcuate and evenly rounded; head setae numerous above eyes, very few setae behind eyes, not extending beyond bulge of eyes. Fontanelle a small circular pore in front of a line joining posterior region of eyes; median spot oval. Frons smooth. Only part of stem of epicranial suture visible. Eyes oval, ocelli short oval; postclypeus posterior margin almost semicircular, with distinct median suture. Labrum broader than long; antennae 15-segmented, 4th and 5th similar, 3rd slightly smaller; 2nd and 6th similar. Pronotum hairy with median white streak, anterior and posterior margin slightly emarginate. Mesonotum and metanotum with moderately incurved hind margins.

Measurements (2 specimens, 1 nest series) (mm):

	Range	Mean
Head length to anterior margin of postclypeus	1.08–1.16	1.10
Head width across eyes	1.14–1.25	1.20
Postclypeus length	0.28–0.30	0.29
Postclypeus width	0.55–0.59	0.57
Labrum length	0.38	0.38
Maximum labrum width	0.45–0.48	0.47
Maximum diameter of eye	0.38–0.40	0.39
Minimum diameter of eye	0.33–0.35	0.34
Maximum diameter of ocellus	0.18	0.18
Minimum diameter of ocellus	0.13	0.13
Distance of ocellus to eye	0.03	0.03
Maximum pronotum length	0.75–0.88	0.77
Maximum pronotum width	1.05–1.15	1.10
Hind tibia length	1.25–1.33	1.27

SOLDIER. Head capsule yellow to orange-yellow; labrum yellow; mandibles brown, bases yellow; postmentum yellow, slightly darker than genae; body, legs and antennae pale yellow. Head capsule short rectangular; head length to base of mandibles longer than maximum head width by 0.10–0.15mm, with many short to long setae, margins parallel or almost parallel from near posterior margin to near antennal sockets; head with many short setae dorsally, pair of setae on frons close together, 0.05mm apart. Labrum moderately long and broad, anterior third with 3 pairs of setae, posterior conspicuous short pairs less than half length of long terminal pair, lateral margins convex, widest in middle, converging anteriorly, tip pointed. Mandibles slender, weakly incurved apically. Antennae with 12/13 segments, 3rd smallest, 4th slightly larger than 3rd, 1st>2nd. Postmentum short and broad. Pronotum narrower than head, lateral lobes with several long setae, anterior margin with small median notch, posterior margin slightly emarginate. Fore tibia weakly inflated.

Measurements (5 specimens from 1 nest series) (mm):

	Range	Mean	Type
Head length with mandibles	1.18–1.25	1.21	1.25
Head length to base of mandibles	0.75–0.81	0.78	0.81
Head width just behind antennal sockets	0.63–0.68	0.65	0.68
Maximum head width	0.65–0.68	0.66	0.68
Labrum length	0.25–0.30	0.28	0.28
Maximum labrum width	0.20–0.21	0.21	0.21
Cross length of left mandible	0.45–0.50	0.47	0.50
Left mandible width	0.05	0.05	0.05
Left mandible curvature	0.03	0.03	0.03
Fore tibia length	0.45–0.48	0.47	0.48
Fore tibia width	0.10–0.11	0.11	0.11
Hind tibia length	0.50–0.53	0.52	0.53
Hind tibia width	0.09–0.10	0.10	0.10
Maximum pronotum width	0.43–0.45	0.44	0.43
Postmentum length	0.38–0.40	0.39	0.40
Maximum postmentum width	0.30–0.33	0.32	0.33

MAJOR WORKER. Head capsule pale yellow to yellow, postclypeus seating deep yellow; body, legs and antennae yellow-white to pale yellow; mandibles brown, bases yellow. Head capsule subrectangular, sides convergent posteriorly, posterior margin broadly and evenly rounded; head setae numerous, regularly and symmetrically arranged; epicranial suture absent; postclypeus small squat bean-shaped, with moderately distinct median suture; anteclypeus flat, medially projecting; labrum with incomplete transverse sclerotized band, tip broadly rounded; postmentum with several long setae; antennae 13-segmented, 3rd smallest, 4th and 5th similar, 1st and 2nd subequal. Pronotum with small anterior lobes, anterior and posterior margins shallowly concave, corners rounded. Fore tibia not inflated; spurs three, dorsal spur almost same length of outer ventral spur; fore coxa conical, single seta on anterior surface not spine-like.

Measurements (3 specimens, from 1 nest series) (mm):

	Range	Mean
Head length to anterior margin of postclypeus	0.88–0.89	0.88
Maximum head width	0.78	0.78
Postclypeus cushion length	0.20	0.20
Postclypeus cushion width	0.33–0.34	0.34
Maximum pronotum width	0.40–0.43	0.42
Fore tibia length	0.43	0.43
Fore tibia width	0.09–0.10	0.10
Hind tibia length	0.45–0.48	0.47
Hind tibia width	0.06–0.08	0.07

BIOLOGY. This species was found in a small part of an *Odontotermes* nest.

COMPARISON. The imago of *mariae* is grouped with *magnocellus*, *vadschaggae*, *alluaudanus* and *albopartitus*. The soldier is grouped with *edwini*, *lounsburyi*, *kairoonae* and *chomaensis*. The worker is close to *edwini*. See the keys for differentiating characters.

MATERIAL EXAMINED.

Holotype soldier: **Kenya**, Masai Mara, 19.ii.1982 (*Darlington*) (NMK).

Paratype imagos, soldiers and workers, data as holotype.

Microtermes mulii sp. n.

(Figs 28–30 imago; 109–114 soldier; 208–210 major worker; 238 distribution)

IMAGO. Head capsule orange-brown, stippled with many large and small yellow dots at bases of setae; postclypeus and labrum yellow; anteclypeus yellow-white; antennae yellow, sides brown, 1st and 2nd

segments darker; pronotum yellow distinctly paler than head capsule, with median white streak. Body yellow, as pronotum; tibiae and tarsi darker than femora. Wings pale yellow, anterior veins darker. Posterior margin of head capsule arcuate and evenly rounded; a few setae above and behind eyes, not extending beyond bulge of eyes; fontanelle a small pore; median spot oval; only stem of epicranial suture visible; head slightly depressed around fontanelle; frons weakly corrugated in front of median spot. Postclypeus not quite semicircular with distinct median suture. Eyes oval; ocelli short oval, not touching eyes. Labrum shorter than wide. Antennae 15-segmented, 3rd, 4th and 5th similar, 1st and 2nd subequal. Pronotum with numerous setae, anterior and posterior margins moderately emarginate; mesonotum and metanotum with moderately deep v-shaped hind margins, median line incomplete. Wings extending beyond body to a length just greater than that of abdomen.

Measurements (11 specimens from 8 nest series) (mm):

	Range	Mean
Head length to anterior margin of postclypeus	1.10–1.20	1.13
Head width across eyes	1.23–1.33	1.27
Postclypeus length	0.30–0.33	0.32
Postclypeus width	0.58–0.63	0.59
Labrum length	0.38–0.40	0.39
Maximum labrum width	0.45–0.50	0.48
Maximum diameter of eye	0.43–0.48	0.44
Minimum diameter of eye	0.36–0.40	0.38
Maximum diameter of ocellus	0.15–0.18	0.16
Minimum diameter of ocellus	0.13–0.15	0.14
Distance ocellus to eye	0.03–0.04	0.03
Maximum pronotum length	0.83–0.93	0.87
Maximum pronotum width	1.13–1.27	1.18
Hind tibia length	1.28–1.40	1.33

SOLDIER. Head capsule and labrum pale yellow to pale orange; mandibles brown to reddish brown, bases yellow; antennae yellow-white to pale yellow; postmentum as head, darker than genae; thoracic nota, abdomen and legs yellow-white to yellow. Head capsule elongately oval, sides converging slightly anteriorly, with several setae; pair of frons setae close together; posterior margin slightly and evenly rounded; labrum tongue-shaped, anterior third with 4 pairs of setae. Mandibles slightly incurved at tip, curvature 0.03–0.04mm. Antennae 13-segmented, 3rd smallest, 4th and 5th similar and larger than 3rd, 1st and 2nd subequal. Postmentum short and broad. Pronotum saddle-shaped, with a few setae, anterior margin with deep v-shaped notch, posterior margin slightly concave; corners rounded. Fore tibia slightly inflated; spurs three, dorsal spur well developed, nearly as long as ventral outer spur, large seta on fore coxa not spine-like.

Measurements (25 specimens from 20 nest series) (mm):

	Range	Mean	Type
Head length with mandibles	1.25–1.40	1.34	1.40
Head length to base of mandibles	0.78–0.93	0.83	0.90
Head width just behind antennal sockets	0.65–0.70	0.68	0.70
Maximum head width	0.69–0.78	0.73	0.75
Labrum length	0.28–0.30	0.29	0.30
Maximum labrum width	0.20–0.23	0.21	0.23
Cross length of left mandible	0.48–0.53	0.51	0.53
Left mandible width	0.04–0.06	0.05	0.05
Left mandible curvature	0.03–0.04	0.04	0.04
Fore tibia length	0.45–0.53	0.49	0.50
Fore tibia width	0.13	0.13	0.13
Hind tibia length	0.50–0.60	0.56	0.58
Hind tibia width	0.08–0.10	0.09	0.08
Maximum pronotum width	0.43–0.50	0.47	0.50
Postmentum length	0.43–0.50	0.45	0.50
Maximum postmentum width	0.32–0.38	0.36	0.35

MAJOR WORKER. Head capsule yellow to orange; mandibles brown, bases yellow; body, legs and antennae pale yellow; postclypeus seating yellow-reddish brown. Head capsule subrectangular; sides nearly parallel; posterior margin broadly and evenly rounded. Head with numerous setae, regularly and symmetrically arranged; fork of epicranial suture present; postclypeus swollen, squat to very squat bean-shaped, median suture moderately distinct; anteclypeus flat, medially projecting anteriorly; labrum with incomplete transverse sclerotized band, tip broadly rounded. Pronotum saddle-shaped with small anterior lobes; anterior and posterior margins slightly concave. Fore tibia not inflated; spurs three, dorsal spur nearly as long as ventral outer spur; fore coxa conical, large seta on anterior surface not spine-like.

Measurements (9 specimens, from 8 nest series) (mm):

	Range	Mean
Head length to anterior margin of postclypeus	0.93–1.03	0.98
Maximum head width	0.80–0.85	0.82
Postclypeus cushion length	0.23–0.26	0.25
Postclypeus cushion width	0.38–0.40	0.39
Maximum pronotum width	0.43–0.48	0.46
Fore tibia length	0.44–0.48	0.46
Fore tibia width	0.09–0.10	0.09
Hind tibia length	0.50–0.55	0.51
Hind tibia width	0.08	0.08

BIOLOGY. All specimens were collected from fungus combs located in the mounds of *Macrotermes subhyalinus* (Rambur) and *Macrotermes michaelseni* (Sjöstedt).

COMPARISON. See under *baginei*.

MATERIAL EXAMINED.

Holotype soldier, **Kenya**, Kajiado, 21.x.1988 (*Bacchus, Bagine*) (NMK).

Paratype imagos, soldiers and workers same data as holotype; and **Kenya**, Kajiado, Nkoele, Bissel, Olkiloriti, Machakos, Komarok near town centre, 20 vials 19.x.1988, 21.x.1988 (*Bacchus, Bagine, J.Muli*) (NMK) (BMNH).

Microtermes pamelae sp. n.

(Figs 34–36 imago; 139–144 soldier; 211–213 major worker; 239 distribution)

IMAGO. Head capsule orange, stippled with many large and small yellow dots at bases of setae; frons paler; postclypeus and labrum yellow; anteclypeus yellow-white; antennae yellow, sides brown; 1st segment brown; pronotum yellow, body, femora, tibiae and tarsi yellow, slightly darker than abdomen. Wings pale yellow, anterior veins darker. Posterior margin of head capsule arcuate and evenly rounded; capsule with many setae above and behind eyes, not extending beyond bulge of eyes; fontanelle absent, median spot oval, faint; part of V of epicranial suture present; frons smooth. Postclypeus posterior margin arcuate, median suture moderately distinct. Eyes nearly round; ocelli short oval, not touching eyes. Labrum shorter than wide. Antennae 16-segmented, 3rd to 5th similar in size, 1st and 2nd subequal. Pronotum with many setae; anterior margin wavy, posterior margin moderately emarginate; mesonotum and metanotum with shallow v-shaped posterior margins.

Measurements (2 specimens, 1 nest series) (mm):

	Range	Mean
Head length to anterior margin of postclypeus	1.28–1.30	1.29
Head width across eyes	1.43–1.48	1.45
Postclypeus length	0.28–0.30	0.29
Postclypeus width	0.58	0.58
Labrum length	0.38	0.38
Maximum labrum width	0.53–0.55	0.54
Maximum diameter of eye	0.45	0.45
Minimum diameter of eye	0.43	0.43
Maximum diameter of ocellus	0.23–0.25	0.24
Minimum diameter of ocellus	0.18–0.20	0.19
Distance ocellus to eye	0.04	0.04
Maximum pronotum length	0.88–0.90	0.89
Maximum pronotum width	1.35–1.38	1.36
Hind tibia length	1.60	1.60

SOLDIER. Head capsule and labrum yellow to orange; mandibles brown to reddish brown, bases yellow; antennae, body and legs pale yellow to yellow; postmentum same colour as head, not darker than

genae. Head capsule elongate oval; widest posteriorly, converging near antennal sockets; sides with many short and fewer long setae; antennae 14-segmented, 3rd and 4th similar, 1st and 2nd subequal; labrum broadly tongue-shaped, anterior third with 8–10 setae; mandibles moderately thick, strongly incurved apically, curvature 0.06–0.08mm; postmentum much longer than wide. Pronotum saddle-shaped, lobes with many setae, anterior lobes divided by a moderately deep median v-shaped notch; posterior lobe large, semicircular, margin slightly concave. Fore tibia very inflated; spurs three, dorsal spur just over half length of ventral outer spur; single long seta on fore coxa not spine-like.

Measurements (13 specimens from 7 nest series) (mm):

	Range	Mean	Type
Head length with mandibles	1.48–1.60	1.54	1.55
Head length to base of mandibles	0.95–1.05	0.96	1.00
Head width just behind antennal sockets	0.78–0.88	0.82	0.83
Maximum head width	0.80–0.90	0.86	0.85
Labrum length	0.30–0.33	0.31	0.30
Labrum width	0.20–0.28	0.25	0.20
Cross length of left mandible	0.58–0.60	0.59	0.58
Left mandible width	0.06–0.07	0.06	0.06
Left mandible curvature	0.06–0.08	0.07	0.06
Fore tibia length	0.60–0.63	0.62	0.63
Fore tibia width	0.15–0.18	0.17	0.16
Hind tibia length	0.70–0.78	0.73	0.73
Hind tibia width	0.10–0.13	0.12	0.13
Pronotum width	0.55–0.60	0.57	0.55
Postmentum length	0.53–0.63	0.56	0.53
Maximum postmentum width	0.35–0.38	0.36	0.35

MAJOR WORKER. Head capsule pale orange, body, legs and antennae yellow. Head capsule squarish, sides almost parallel; posterior margin broadly and evenly rounded; laterally with numerous setae, setae of unequal lengths. Antennae 14-segmented, 4th smallest, 3rd just smaller than 5th; postclypeus swollen, squat bean-shaped, median suture moderately distinct; anteclypeus flat, medially projecting anteriorly; only v of epicranial suture visible; labrum with transverse sclerotized band, tip broadly rounded. Pronotum saddle-shaped, anterior and posterior margins slightly concave. Fore tibia not inflated; spurs three, dorsal spur about half length of ventral outer spur; single large seta on anterior surface of fore coxa nearly spine-like.

Measurements (4 specimens, 3 nest series) (mm):

	Range	Mean
Head length to anterior margin of postclypeus	1.15–1.23	1.19
Maximum head width	1.00–1.10	1.06
Postclypeus cushion length	0.20	0.20

Postclypeus cushion width	0.40–0.43	0.42
Maximum pronotum width	0.54–0.58	0.54
Fore tibia length	0.55–0.60	0.57
Fore tibia width	0.10	0.10
Hind tibia length	0.63–0.70	0.65
Hind tibia width	0.08–0.09	0.09

BIOLOGY. Collection records refer to colonies from *Macrotermes* mounds in tall moist woodland and under a burnt log.

COMPARISON. The imago and soldier are grouped with *redenianus* and *luteus* but the imago can be separated from these species by its longer head length and longer hind tibia. The worker is grouped with *luteus*, *lokoriensis* and *redenianus*. See the keys for differentiating characters.

MATERIAL EXAMINED.

Holotype soldier: **Zambia**, Northern Province, Mbala, 23.xii.1969 (*Bingham*).

Paratype imagos, soldiers and workers, same data as holotype; and **Zambia**, Kasama Mbala; Northern Province, Orissa Falls; Ndola: Kansengi, 15 miles from Kitwe, 67 miles from Ndola towards Lusaka, 22 miles from Kitwe, 4 miles north of Lusaka, 11 vials, 23.i.1957, 20.i.1957, 23.xii.1969, 20.xii.1969, 17.vii.1968 (*Bingham*).

Microtermes redenianus (Sjöstedt)

(Figs 37–39 imago; 145–150 soldier; 214–216 major worker; 240 distribution)

Termes (*Microtermes*) *redenianus* Sjöstedt, 1904: 68:

LECTOTYPE soldier: Tanzania (AMNH) here designated [examined].

Microtermes usambaricus Sjöstedt, 1926: 69:

LECTOTYPE soldier: Tanzania (NR) here designated [examined]. **Syn. n.**

IMAGO. Head capsule reddish orange, sometimes darker above ocellus and behind eyes; frons paler; head stippled with many minute yellow dots at bases of setae; anteclypeus, postclypeus and labrum yellow; antennae pale yellow; pronotum pale orange; tergites and sternites slightly paler than pronotum, legs dull yellow. Wings pale yellow, anterior veins darker. Posterior margin of head capsule broadly and evenly rounded; hairs of head capsule brown with many short and long setae above and behind eyes, longest setae may or may not reach just beyond outer curve of eyes; vertex flat about region of fontanelle; frons slightly rough with weak corrugations; epicranial suture hardly visible. Eyes and ocelli oval, postclypeus arcuate, faintly reticulate with faint to bold median line; labrum broader than long; antennae 16-segmented, 3rd, 4th and 5th about same size, 1st and 2nd subequal. Pronotum with many setae; anterior and posterior

margin slightly emarginate; mesonotum and metanotum with deep incurvate hind margins without median line.

Measurements (4 specimens from 2 nest series) (mm):

	Range	Mean
Head length to anterior margin of postclypeus	1.18–1.25	1.23
Head width across eyes	1.33–1.43	1.38
Postclypeus length	0.30–0.33	0.32
Postclypeus width	0.56–0.63	0.60
Labrum length	0.35–0.43	0.40
Maximum labrum width	0.50	0.50
Maximum diameter of eye	0.36–0.43	0.38
Minimum diameter of eye	0.34–0.38	0.36
Maximum diameter of ocellus	0.20–0.23	0.22
Minimum diameter of ocellus	0.15	0.15
Distance of ocellus to eye	0.05–0.08	0.07
Maximum pronotum length	0.83–0.95	0.88
Maximum pronotum width	1.21–0.40	1.32
Hind tibia length	1.43–1.53	1.48

SOLDIER. Head capsule and labrum yellow to orange; mandibles brown, bases yellow; antennae pale yellow to yellow; postmentum and genae as head; thoracic nota, body and legs pale yellow to yellow. Head capsule short oval, nearly round, posterior margin broadly rounded; lateral margins with many short and a few long setae; labrum tongue-shaped, nearly as wide as long, extending to beyond 0.65 length of mandible; dorsal surface with many setae, anterior third with 8 to 10 setae; mandibles moderately thick, tip moderately incurved, curvature 0.04–0.06mm. Antennae 14-segmented, 3rd and 4th segments similar, 1st and 2nd subequal; postmentum short and broad. Pronotum saddle-shaped with many short and several long setae; anterior margin with deep median v-shaped notch, posterior margin almost straight. Fore tibiae moderately to strongly inflated; spurs three, dorsal spur short, about half length of outer ventral spur; long seta on fore coxa not spine-like.

Measurements (22 specimens, 19 nest series) (mm):

	Range	Mean	Type
Head length with mandibles	1.20–1.38	1.27	1.22
Head length to base of mandibles	0.73–0.88	0.80	0.78
Head width just behind antennal sockets	0.60–0.75	0.66	0.65
Maximum head width	0.69–0.80	0.74	0.72
Labrum length	0.26–0.33	0.31	0.26
Maximum labrum width	0.22–0.28	0.26	0.22
Cross length of left mandible	0.50–0.55	0.52	0.50
Left mandible width	0.04–0.05	0.04	0.05
Left mandible curvature	0.04–0.06	0.05	0.04
Fore tibia length	0.55–0.63	0.60	0.58
Fore tibia width	0.15–0.18	0.17	0.16

Hind tibia length	0.63–0.70	0.66	0.63
Hind tibia width	0.10–0.13	0.12	0.11
Maximum pronotum width	0.48–0.57	0.49	0.50
Postmentum length	0.40–0.45	0.41	0.43
Maximum postmentum width	0.33–0.38	0.35	0.33

MAJOR WORKER. Head capsule yellow, body, legs and antennae pale yellow; postclypeus seating dark yellow-brown; mandibles brown, bases yellow. Head capsule squarish to subrectangular, sides parallel or convergent behind; posterior margin broadly rounded; head with many setae, regularly and symmetrically arranged; fork of epicranial suture visible; postclypeus swollen, large squat bean-shaped, median suture faint to moderately distinct; anteclypeus flat, medially projecting anteriorly; antennae 14-segmented, 3rd smallest, 4th and 5th similar, 6th just larger. Pronotum saddle-shaped with small anterior lobes, anterior margin with shallow obtuse angular notch, posterior margin slightly concave, corners rounded. Fore tibia not inflated, spurs three, dorsal spur about half length of outer ventral spur; large seta on anterior surface of fore coxa not spine-like.

Measurements (14 specimens, 11 nest series) (mm):

	Range	Mean
Head length to anterior margin of postclypeus	1.00–1.18	1.08
Maximum head width	0.88–1.03	0.96
Postclypeus cushion length	0.19–0.24	0.21
Postclypeus cushion width	0.38–0.43	0.39
Maximum pronotum width	0.50–0.55	0.51
Fore tibia length	0.53–0.60	0.56
Fore tibia width	0.08–0.13	0.12
Hind tibia length	0.60–0.68	0.64
Hind tibia width	0.06–0.10	0.08

BIOLOGY. This species is abundant in woodland and thicket on the plains of Tanzania extending up to an altitude of 4000 feet on mountainsides (Kemp, 1955). In Kenya it was found in a *Macrotermes* nest, in a eucalyptus plantation two miles from Machakos town centre near the main road towards Mombasa, and in cultivated areas in old roots and stems of maize on the Mombasa road, 26 kilometres from Nairobi. The Malawi specimens examined are from colonies in dead wood, in a dead log and in a fallen palm tree.

COMPARISON. The imago of this species comes closest to that of *luteus*. The soldier is closest in size to that of *mariae*. See the keys for differentiating characters.

MATERIAL EXAMINED.

Lectotype (of *redenianus*), **Tanzania** (AMNH).
Lectotype (of *usambaricus*), **Tanzania** (NR).
Other material: **Tanzania**, Handeni, Pangami Falls, Morogoro, Mombo, Ngomeni, Daluni, Tanga, 9.viii.1963, 30.xi.1951, 13.xi.1951, 14.ii.1975,

11.x.1957, 12.vii.1951, 14.ii.1952 (*Bigger, Sands*) (*Harris*) (*Kemp*) (*Reden*); **Kenya**, Machakos, Bura; Mwatate, Kibwezi, 20 kilometres from Malindi; Latika, 26 miles from Mitto Andei on main roadside to Nairobi; 7.iii.1953, 26.x.1988, 1.xi.1988 (*Bacchus, Bagine*); **Malawi**, 11 miles north of Domasi on Namwera Road, near Namatulu Hill, Zomba district, Monkey Bay, Kasungu on Kota Kota Road, North of Nchalo, Chikwawa grassland, North of Dumasi, 3 miles from Monkey Bay; Eight miles from Monkey Bay, 22.viii.1953, 1.x.1953, 24.viii.1953, 17.ix.1953, 14–26.viii.1953 (*Sands, Wilkinson*).

Microtermes tsavoensis sp. n.

(Figs 151–156 soldier; 217–219 major worker; 241 distribution)

IMAGO. Unknown.

SOLDIER. Head capsule and labrum yellow to pale orange; mandibles brown to reddish brown, bases yellow; antennae, body and legs pale yellow; sides of antennae brownish; postmentum yellow, slightly darker than genae. Head capsule subrectangular; sides parallel or convergent slightly behind antennal sockets; posterior margin evenly and slightly rounded; several long and very short setae on sides; pair of frons setae close together; labrum narrow tongue-shaped, anterior third with 3 pairs of setae, terminal pair longest, posterior pairs about half length of long pair; mandible tip moderately incurved, curvature 0.04–0.06mm; antennae 13-segmented, 3rd smallest, 4th slightly larger, 1st and 2nd subequal; postmentum short and broad. Pronotum saddle-shaped with several long setae, anterior margin with small v-shaped notch, posterior margin slightly concave; corners rounded. Fore tibia slightly inflated; spurs three, dorsal spur as long as outer ventral spur; single large seta on anterior surface of coxa nearly spine-like.

Measurements (12 specimens, 12 nest series) (mm):

	Range	Mean	Type
Head length with mandibles	1.38–1.55	1.45	1.48
Head length to base of mandibles	0.88–1.00	0.93	0.93
Head width just behind antennal sockets	0.68–0.75	0.73	0.70
Maximum head width	0.69–0.80	0.75	0.76
Labrum length	0.28–0.33	0.30	0.28
Maximum labrum width	0.19–0.21	0.20	0.20
Cross length of left mandible	0.55–0.58	0.57	0.58
Left mandible width	0.05	0.05	0.05
Left mandible curvature	0.04–0.06	0.05	0.05
Fore tibia length	0.45–0.53	0.51	0.50
Fore tibia width	0.10–0.13	0.12	0.11
Hind tibia length	0.55–0.60	0.57	0.56
Hind tibia width	0.08–0.10	0.09	0.09
Maximum pronotum width	0.48–0.53	0.50	0.50
Postmentum length	0.48–0.50	0.49	0.49
Maximum postmentum width	0.33–0.35	0.34	0.33

MAJOR WORKER. Head capsule yellow to orange; mandibles brown, bases yellow; body, legs and antennae pale yellow; postclypeus seating reddish brown. Head capsule subrectangular; sides nearly parallel; posterior margin broadly and evenly rounded. Head moderately hairy, hairs symmetrically arranged; postclypeus large, swollen, almost semicircular; anteclypeus flat, medially projecting anteriorly; only part of fork of epicranial suture visible; antennae 13-segmented, 3rd and 4th about same size, 1st and 2nd subequal; labrum with incomplete sclerotized band, tip broadly rounded; postmentum with several long setae. Pronotum saddle-shaped, anterior margin very slightly incurved in middle, posterior margin straight. Fore tibia not inflated; spurs three, dorsal spur almost as long as outer ventral spur; single long seta on anterior surface of fore coxa not spine-like.

Measurements (9 specimens from 9 nest series) (mm):

	Range	Mean
Head length to anterior margin of postclypeus	0.88–1.00	0.95
Maximum head width	0.75–0.80	0.78
Postclypeus cushion length	0.25–0.26	0.25
Postclypeus cushion width	0.38–0.41	0.39
Maximum pronotum width	0.38–0.45	0.43
Fore tibia length	0.38–0.45	0.43
Fore tibia width	0.08–0.09	0.09
Hind tibia length	0.48–0.50	0.49
Hind tibia width	0.06–0.08	0.07

BIOLOGY. Colonies were collected from rotten baobab stems, old sisal posts and from maize stubble in cultivated farm lands.

COMPARISON. The soldier of *tsavoensis* is close to a number of species. It can be separated from these by its longer mandibles, 0.55–0.58mm compared with 0.48–0.53mm. The worker is closest to that of *mulii* but has a shorter hind tibia, 0.48–0.50mm compared with 0.50–0.55mm.

MATERIAL EXAMINED.

Holotype soldier: **Kenya**, Maktau, Tsavo Park, West, 1.xi.1988 (*Bacchus, Bagine*) (NMK).

Paratype soldiers and workers, same data as holotype; and **Kenya**, Mtito Andei, Tsavo National Park East 28.x.1988; Latika, Voi, 1.xi.1988, 12 vials (*Bacchus, Bagine*).

Microtermes vadschaggae (Sjöstedt)

(Figs 40–42 imago; 157–162 soldier; 220–222 major worker; 242 distribution)

Termes (*Microtermes*) *vadschaggae* Sjöstedt 1907: 9–10. Paratype soldier, imago: **Tanzania** (AMNH) [examined].

IMAGO. Head capsule orange-yellow to orange-brown, genae paler, head stippled with many large and small pale yellow dots at bases of setae, anteclypeus and labrum yellow-white, antennae pale yellow, 1st and 2nd segments darker. Postclypeus yellow, pronotum yellow to yellow-brown, slightly paler than head, with pallid cross. Abdominal tergites pale yellow, brown, sternites slightly paler, legs uniformly yellow. Wings pale yellow, anterior veins darker. Posterior margin of head capsule arcuate and evenly rounded; vertex not depressed about fontanelle; frons smooth and sloping towards postclypeus; several short and long hairs above and behind eyes, long hairs extending almost to curvature of eyes; fontanelle a very small pore, smaller than ocellus, median spot small, nearly round; part of stem of cranial suture visible. Eyes nearly round; ocellus short, nearly round, far from eyes; median suture of postclypeus moderately distinct; labrum shorter than wide; antennae 15-segmented, 3rd just smaller than 4th, 1st and 2nd subequal. Pronotum hairy, denser on lateral margins, suture faint, anterior and posterior margins slightly emarginate. Mesonotum and metanotum without median line, posterior margins moderately emarginate. Wings extending to beyond length of abdomen.

Measurements (3 specimens, 3 nest series) (mm):

	Range	Mean
Head length to anterior margin of postclypeus	1.08–1.10	1.09
Head width across eyes	1.20–1.26	1.24
Postclypeus length	0.30–0.33	0.31
Postclypeus width	0.58	0.58
Length of labrum	0.34–0.40	0.38
Width of labrum	0.45–0.48	0.47
Maximum diameter of eye	0.33–0.35	0.34
Minimum diameter of eye	0.31	0.31
Maximum diameter of ocellus	0.13–0.15	0.14
Minimum diameter of ocellus	0.09–0.11	0.10
Distance of ocellus to eye	0.05	0.05
Maximum pronotum length	0.70–0.75	0.73
Maximum pronotum width	1.08–0.13	1.10
Hind tibia length	1.13–1.25	1.21

SOLDIER. Head capsule yellow to dull yellow; mandibles brown, yellow-brown, bases yellow; antennae, body and legs pale yellow. Head capsule short to elongately oval, sides tapering anteriorly from just behind antennal sockets. Labrum tongue-shaped, reaching to near tip of mandibles, widest in middle, converging anteriorly into a pointed tip; anterior one-third with 3–4 pairs of setae. Mandibles moderately robust, tips incurved, curvature 0.04–0.05mm. Antennae 13-segmented, 1st and 2nd subequal, 3rd the smallest, 4th much larger. Pronotum narrower than head capsule with small anterior lobes divided by

moderately deep v-shaped median notch, posterior lobes large and semicircular, margin slightly incurved in middle. Fore tibia very inflated.

Measurements (16 specimens, 16 nest series) (mm):

	Range	Mean	Type
Head length with mandibles	1.25–1.38	1.31	1.31
Head length to base of mandibles	0.80–0.88	0.83	0.83
Head width just behind antennal sockets	0.63–0.73	0.67	0.65
Maximum head width	0.70–0.78	0.73	0.74
Labrum length	0.28–0.33	0.31	0.31
Maximum labrum width	0.19–0.23	0.21	0.19
Cross length of left mandible	0.48–0.53	0.52	0.52
Mandible width	0.05–0.06	0.05	–
Mandible curvature	0.04–0.05	0.05	–
Fore tibia length	0.48–0.53	0.51	0.48
Fore tibia width	0.14–0.15	0.15	0.15
Hind tibia length	0.55–0.60	0.57	0.56
Hind tibia width	0.10–0.11	0.10	0.11
Maximum pronotum width	0.44–0.53	0.48	0.44
Postmentum length	0.40–0.45	0.43	0.44
Maximum postmentum width	0.30–0.33	0.32	0.30

MAJOR WORKER. Head capsule yellow to dull yellow; mandibles brown, bases yellow; antennae, pronotum, legs, abdominal tergites and sternites pale yellow; postclypeus seating dark brown. Head capsule subrectangular, sides parallel; posterior margin broadly and evenly rounded; head setae numerous, regularly and symmetrically arranged; fork of epicranial suture present; postmentum with several hairs. Antennae 13-segmented, 3rd the smallest, 4th slightly larger, 1st and 2nd subequal. Postclypeus swollen, very squat bean-shaped with distinct median suture, posterior margin evenly rounded; anteclypeus flat, medially projecting anteriorly. Labrum broadly rounded; transverse sclerotized band incomplete. Pronotum saddle-shaped with small anterior lobes, anterior and posterior margins shallow concave; Fore tibia not inflated; dorsal spur about same length as ventral outer spur. Fore coxa conical, large seta on anterior surface not spine-like.

Measurements (3 specimens, 3 nest series) (mm):

	Range	Mean
Head length to anterior margin of postclypeus	1.00	1.00
Maximum head width	0.83–0.85	0.84
Postclypeus cushion length	0.20–0.21	0.20
Postclypeus cushion width	0.38	0.38
Maximum pronotum width	0.45	0.45
Fore tibia length	0.45	0.45
Fore tibia width	0.09	0.09
Hind tibia length	0.50–0.53	0.52
Hind tibia width	0.08	0.08

BIOLOGY. This species was found frequently near Mt. Kilimanjaro where it made its fungus gardens in the earth construction of the termite *Amitermes* (as *Amphidotermes*) (Termitidae: Termitinae) (Sjöstedt, 1907). Fungus combs varied from the size of a hazelnut to a walnut. Winged forms swarmed from holes in the ground in the cultivated zone near Kibonoto in May. Their flight is rather slow and fluttering, slowly rising. Soldiers and workers formed large groups around the holes. They also swarmed in scattered massed groups on the Masai plain in March during wet weather (Sjöstedt, 1926).

COMPARISON. The alate of *vadschaggae* is grouped with that of *etiolatus* and *albopartitus*. The soldier is close to *darlingtonae* (q.v.). The worker is closest to *alluaudanus*. In *vadschaggae*, the postclypeus rim is dark brown compared with yellow-brown in *alluaudanus*. See the keys for differentiating characters.

MATERIAL EXAMINED.

Paratype soldier, imago: **Tanzania**, Kilimanjaro, 12.iv.1906 (Sjöstedt) (AMNH).

Other material: **Tanzania**, Tengem, Mgera, Handeni, 30.viii.1950, 26.ii.1952, 8.iii.1952 (Harris) (Kemp); **Kenya**, Nairobi, Machakos, Mogotio, 12.x.1990, 7.v.1983 (*Bacchus*, *Bagine*) (*Bagine*) (Darlington).

ACKNOWLEDGEMENTS I am very grateful to Dr W. A. Sands OBE, former Head of the Department of Applied Biology, Tropical Development and Research Institute (Natural Resources Institute, Chatham), who established the collaborative study of *Microtermes* between the National Museums of Kenya, Nairobi and the Natural Resources Institute, Chatham, England.

My sincere thanks go to Mrs C.A. Mwango, Permanent Secretary, Office of the President, Nairobi, for issuing permit number OP 13/00/16C290/10 on behalf of the Government of Kenya to conduct *Microtermes* research in Kenya.

For the facilities extended to me during my field visits to Kenya, I thank Mr A. Kirk, Aid Attaché, British High Commission, Nairobi. For assistance and hospitality I thank Dr J.M. Ritchie, former Head of the Department of Entomology, National Museums of Kenya, Nairobi. I owe a particular debt to Dr R.K.N. Bagine, Head of Department of Invertebrate Zoology, National Museums of Kenya, Nairobi, for his help and hospitality. My sincere thanks go to Mr Julius Muli, National Museums of Kenya, and Mr Edwin Muli, field assistants, for their untiring efforts in helping obtain three excellent collections of Kenyan *Microtermes*.

Thanks are also due to the curators of the institutions cited above for supplying type and other material for this study.

I thank Dr A. Russell Smith, Dr N. Jago and Dr T. G. Wood for reading and criticising the manuscript and Mr M. J. Pearce and Miss H. Black for comments on the keys.

Editor's note:

Following Solomon Bacchus's untimely death, final revision of this paper before publication was undertaken by Dr J.P.E.C. Darlington of the University Museum of Zoology, Cambridge, UK. We are extremely grateful to her and to Solomon's colleagues at NRI for their unstinting efforts in bringing the manuscript to press.

REFERENCES

- Abushama, F.T. and Kambal, M.A. 1977. The role of sugars in the food-selection of the termite *Microtermes tragardhi* (Sjöst.). *Zeitschrift für Angewandte Entomologie*, **84**: 250–255.
- Agarwal, R.A. 1972. Problems of termites of sugarcane in India. Pp 46–55. In: Roonwal, M.L. (ed), *Termite problems in India*. New Delhi, Indian Council of Scientific and Industrial Research. 81 pp.
- Agaral, S.B.D. and Sharma, C. 1954. Aldrin and dieldrin as outstanding agents in the control of *Microtermes obesi* Holmg. on maize in Bihar. *Indian Journal of Entomology*, **16**: 78–79.
- Ahmad, M. 1955. A new termite from East Pakistan (Isoptera:Termitidae) *Biologia*, **1**(1): 25–29.
- Aktar, M.S. 1975. Taxonomy and zoogeography of the termites (Isoptera) of Bangladesh. *Bulletin of the Department of Zoology, Punjab University (N.S.)*, **7**: 1–199.
- Barnett, E.A. Cowie, R. & Wood, T.G. 1990. *Microtermes aethiopicus* sp. n., a fungus-growing termite (Isoptera: Termitidae: Macrotermitinae) from Ethiopia. *Systematic Entomology*, **13**: 133–141.
- Black, H.I.J. & Wood, T.G. 1989. The effects of cultivation on the vertical distribution of *Microtermes* spp. (Isoptera: Termitidae: Macrotermitinae) in soil at Mokwa Nigeria. *Sociobiology*, **15**: 133–138.
- Bose, G. 1984. Termite fauna of southern India. *Records of the Zoological Survey of India, Miscellaneous Publications*, **49**: 1–270.
- Butani, D.K. 1967 Sugarcane and its problems. *Indian Sugar*, **17**: 543–549.
- Cachan, P. 1949. Les Termites de Madagascar. *Mémoires de l'Institut Scientifique de Madagascar, A*, **111**: 177–275.
- Chatterjee, P.N. and Thakur, M.L. 1964. Revision of the termite genus *Microtermes* Wasmann (Isoptera: Termitidae: Macrotermitinae) from the Indian region. *Indian Forest Records (N.S.)*, *Entomology*, **10**: 219–260.
- Coaton, W.G.H. 1962. Survey of the termites of the Kruger National Park. *Koedoe*, **5**: 144–156.
- Cowie, R.H. and Wood, T.G. 1989. Damage to crops, forestry, and rangeland by fungus growing termites (Termitidae: Macrotermitinae) in Ethiopia. *Sociobiology*, **15**: 139–153.
- Desneux, J. 1906. Variétés termitologiques. *Annales de la Société Entomologique de Belgique*, **49**: 336–360.
- Dutt, N. 1962. Preliminary observations on the incidence of termites attacking jute. Pp. 217–218. In: *Proceedings of the New Delhi Symposium*, 1960. UNESCO, Paris.
- Emerson, E.A. 1928. Termites of the Belgian Congo and the Cameroons. *Bulletin of the American Museum of Natural History*, **57**: 401–574.
- Emerson, E.A. 1955. Geographical origins and dispersions of termite genera. *Fieldiana. Zoology*, **37**: 465–521.
- Fuller, C. 1922. The termites of South Africa. *South African Journal of Natural History*, **3**: 70–131.
- Ghidini, G.M. 1937. Missione del Prof. Edoardo Zavattari nei paesi dei Borana. Nuove specie di Termitidi (Diagnosi preventive). *Bolletino della Società Entomologica Italiana*, **69**: 141–143.

- Ghidini, G.M. 1955. Missione biologica Sagon-Omo diretta dal Prof. Edoardo Zavattari. Termitidae. *Rivista di Biologia Coloniale, Roma*, **15**: 69–82.
- Ghose, S.K. 1964. Insecticidal control of termite, *Microtermes* sp. (Macrotermitinae, Termitidae, Isoptera), damaging wheat crop. *Indian Agriculture*, **8**: 87–91.
- Grassé, P.P. 1937. Recherches sur la systematique et la biologie des termites de l'Afrique Occidentale Française. *Bulletin de la Société Entomologique de France*, **106**: 1–100.
- Hagen, H.A. 1853. Hr. Peters beschriebte über die von ihm gesammelten und von Hrn Dr Hermann Hagen bearbeiteten Neuropteren aus Mossambique. *Bericht über die zur Bekanntmachung geeigneten Verhandlungen der Königlich Preussischen Akademie der Wissenschaften zu Berlin*, **1853**: 479–482.
- Harris, W.V. 1953. A new Termite from the Belgian Congo. *Revue de Zoologie et de Botanique Africaines*, **47**: 3–4.
- Harris, W.V. 1954. Further records of East African Termites II. *Proceedings of the Royal Entomological Society of London (B)*, **23**: 127–137.
- Harris, W.V. 1958. Isoptera. *Exploration du Parc National de l'Upemba, Mission G.F. de Witte*, **52(1)**: 3–26.
- Harris, W.V. 1969. Termites as Pests of Sugarcane. In: Williams, J.R., Metcalfe, J.R., Mongomery, R.W. and Mathes, R. (eds), *Pests of sugar cane*. 225 pp. Elsevier, London.
- Harris, W.V. 1971. *Termites. Their recognition and control*. 186 pp. Longmans, London. (2nd edition.)
- Haviland, G.D. 1898. Observations on termites: with descriptions of new species. *Journal of the Linnean Society of London*, **26**: 358–442.
- Holmgren, N. 1909. Termitenstudien. 1. Anatomische Untersuchungen. *Kungliga Svenska VetenskapsAkademiens Handlingar*, **44(3)**: 1–215.
- Holmgren, N. 1913. Termiten aus Natal und dem Zululande. Gesammelt von Dr. Ivar Trågardh. *Entomologisk Tidskrift*, **34**: 321–366.
- Johnson, R.A., Lamb, R.W. & Wood, T.G. 1981. Termite damage and crop loss studies in Nigeria – a survey of damage to ground-nuts. *Tropical Pest Management*, **27**: 325–342.
- Keay, R.W.J. 1959. Vegetation map of Africa south of the Tropic of Cancer. Explanatory notes. 24 pp, one map. Oxford University Press.
- Kemner, N.A. 1934. Systematische und biologische Studien über die Termiten Javas und Celebes. *Kungliga Svenska VetenskapsAkademiens Handlingar, ser. 3*, **13(4)**: 1–241.
- Kemp, P.B. 1955. The termites of North-Eastern Tanganyika: their distribution and biology. *Bulletin of Entomological Research*, **46**: 113–135.
- Kushwara, K.S. 1960. A note on infestation of termites around Adapur. *Science and Culture*, **26**: 39–40.
- Oshima, M. 1923. Fauna Simalurensis-Termitidae. *Capita Zoologica*, **2**: 1–22, 20 figs.
- Roonwal, M.L. 1969. The measurements of termites (Isoptera) for taxonomic purposes. *Journal of the Zoological Society of India*, **21**: 9–66.
- Roonwal, M.L. & Chhotani, O.B. 1962. Termite fauna of Assam region, Eastern India. *Proceedings of the National Institute of Science, India, (B)*, **28**: 281–406.
- Sands, W.A. 1960. Observations on termites destructive to trees and crops. Pp. 14–63. In: Harris W.V. (ed.), *Termite research in West Africa*. [Multigraph.] 63 pp. Department of Technical Co-operation, London.
- Sands, W.A. 1965. A revision of the termite subfamily Nasutitermitinae (Isoptera: Termitidae) from the Ethiopian region. *Bulletin of the British Museum (Natural History), Entomology, Supplement*, **4**: 1–172.
- Sands, W.A. 1967. The distribution of nasute termites (Isoptera, Termitidae, Nasutitermitinae) in the Ethiopian zoogeographical Region. *Compte Rendu, 5ème Congrès UIEIS, Toulouse, 1965*: 159–172.
- Sands, W.A. 1972. The soldierless termites of Africa (Isoptera: Termitidae). *Bulletin of the British Museum (Natural History), Entomology, Supplement*, **18**: 1–244.
- Sen-Sarma, P.K. 1981. In: Veeresh, G.K. (ed.) Progress in soil biology and ecology in India. *University of Agricultural Sciences, Bangalore, Technical Series*, **37**: i–ix, 1–351.
- Sjöstedt, Y. 1904. Monographie der Termiten Afrikas. *Kungliga Svenska VetenskapsAkademiens Handlingar*, **38(4)**: 1–120.
- Sjöstedt, Y. 1907. 15. Corrodentia; No.1., Termitidae. In: *Wissenschaftliche Ergebnisse der Schwedischen Zoologische Expedition nach dem Kilimandjaro, den Meru und den umgebenden Massaissteppen Deutsch-Ostafrika, 1905–06*, **3(15)**: 1–24, 4 pls. Uppsala.
- Sjöstedt, Y. 1911. Neue afrikanische Termiten im schwedischen Reichsmuseum. *Arkiv för Zoologi*, **7(20)**: 1–18.
- Sjöstedt, Y. 1913. Ergebnisse einer botanischen Forschungsreise von J. Brunnthaler nach Deutsch-Ostafrika und Südafrika (Kapland, Natal und Rhodesien). Termiten. *Denschriften der Kaiserlichen Akademie der Wissenschaften, Wien*, **88**: 720–721.
- Sjöstedt, Y. 1914. Termiten aus Madagaskar eingesammelt von Herrn Dr W. Kaudern 1911–1912. *Arkiv för Zoologi*, **18(27)**: 1–19.
- Sjöstedt, Y. 1915. Insectes Pseudoneuroptères. 1. Termitidae. *Voyage Ch. Alluaud et R. Jeannel en Afrique Orientale, 1911–12*: 1–18.
- Sjöstedt, Y. 1924. Über das unterirdische Nest einer bisher unbekannten Termite aus Kongo. *Arkiv för Zoologi*, **15(20)**: 1–8.
- Sjöstedt, Y. 1926. Revision der Termiten Afrikas. 3. Monographie. *Kungliga Svenska VetenskapsAkademiens Handlingar*, **3(1)**: 1–419.
- Srivasta, B.K. 1959. Insect pest of maize in Rajasthan. *Journal of the Bombay Natural History Society*, **56**: 665–668.
- Silvestri, F. 1912–1914. Termiti Racolte da L. Fea all' Guinea. *Annali del Museo Civico di Storia Naturale Giacomo Doria, Genova*, **(5)14**: 1–146.
- Snyder, T.E. 1949. Catalog of the termites (Isoptera) of the world. *Smithsonian Miscellaneous Collections*, **112**: 490.
- Thakur, M.L. & Sen-Sarma, P.K. 1980. Current status of termites as pest of forest nurseries and plantation in India. *Journal of the Indian Academy of Wood Science*, **11**: 7–15.
- Tsai, P.-H. & Chen, N.-S. 1963. New termites from South China. *Acta Entomologica Sinica*, **12**: 196–198.
- Verma, A.N., Bhanot, J.P. & Khurana, A.D. 1978. The effects of termite damage on the earing stage of the wheat crop on the reduction in grain yield. *Indian Journal of Ecology*, **5**: 108–109.
- Wasmann, E. 1902. Termiten, Termitophilen und Myrmecophilen, gesammelt auf Ceylon von Dr. W. Horn 1899, mit andern ost-indischen Material bearbeitet. *Zoologische Jahrbücher, Abteilung für Systematik, Geographie und Biologie der Tiere*, **17(1)**: 99–164.
- Watson, J.A.L. & Perry, D.H. 1981. The Australian harvester termites of the genus *Drepanotermes* (Isoptera: Termitidae). *Australian Journal of Zoology, Supplement*, **78**: 1–153.
- Williams, R.M.C. 1966. The East African termite of the genus *Cubitermes* (Isoptera: Termitidae). *Transactions of the Royal Entomological Society of London*, **118**: 73–118.
- Wood, T.G. 1986. Assessment of termite damage in Ethiopia and recommendations for short term control and development of long term pest management strategies. Ministry of Agriculture, Addis Ababa.
- Wood, T.G. 1991. Termites in Ethiopia: the environmental impact of their damage and resultant control measures. *Ambio*, **20**: 136–138.
- Wood, T.G., Bednarzik, M. & Aden, H. 1987. Damage to crops by *Microtermes najdensis* (Isoptera: Macrotermitinae) in irrigated semi-desert areas of the Red Sea coast. I. The Tihama region of the Yemen-Arab-Republic. *Tropical Pest Management*, **33**: 142–150.
- Wood, T.G. & Johnson, R.A. 1978. Abundance and vertical distribution in soil of *Microtermes* (Isoptera, Termitidae) in savannah woodland and agricultural ecosystems at Mokwa, Nigeria. *Memo-rabilia Zoologia*, **29**: 203–213.
- Wood, T.G., Johnson, R.A. & Ohiaigu, C.E. 1977. Populations of termites (Isoptera) in natural and agricultural ecosystems in Southern Guinea Savannah near Mokwa, Nigeria. *Geo-Eco-Trop*, **1**: 139–148.

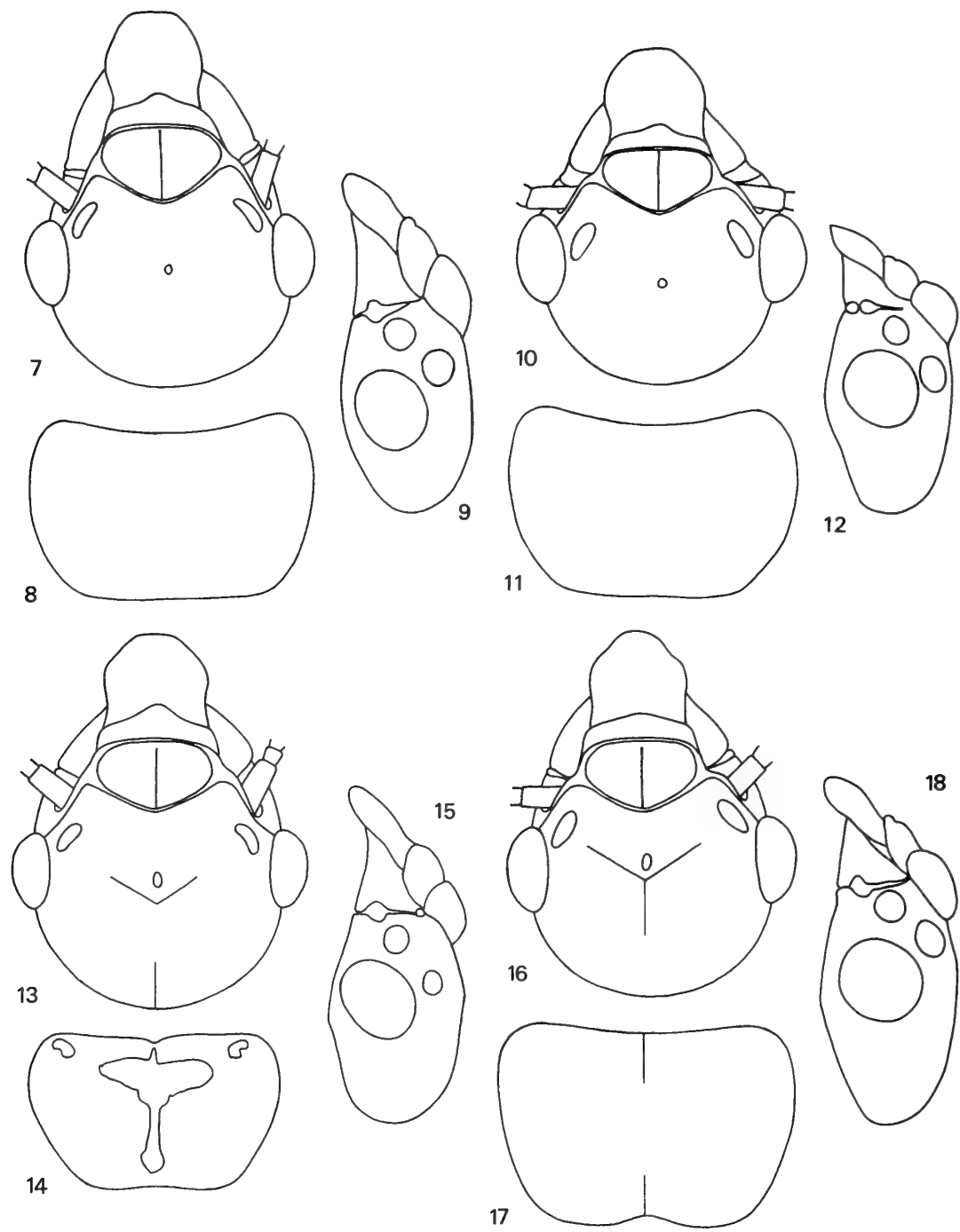
Wood, T.G., Johnson, R.A. & Ohiagu, C.E. 1980. Termite damage and crop loss studies in Nigeria – a review of termite (Isoptera) damage, loss in yield and termite (*Microtermes*) abundance at Mokwa. *Tropical Pest Management*, **26**: 241–253.

Wood, T.G. & Pearce, M.J. 1991. Termites in Africa. The environmental impact of control measures and damage to crops, trees, rangeland and rural buildings. *Sociobiology*, **19**: 221.

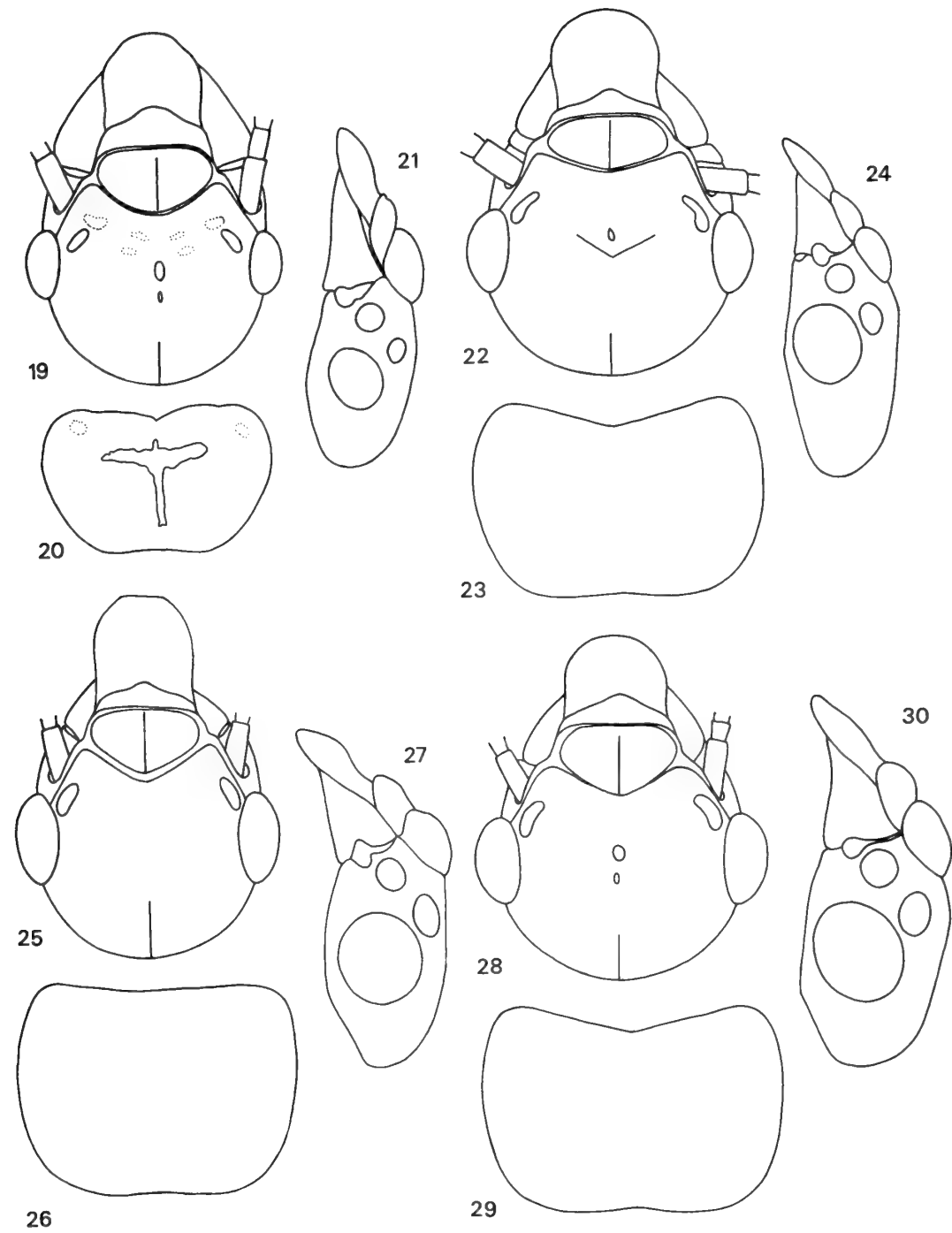
INDEX

Synonyms and misidentifications are in *italics*; principal references are in **bold**.

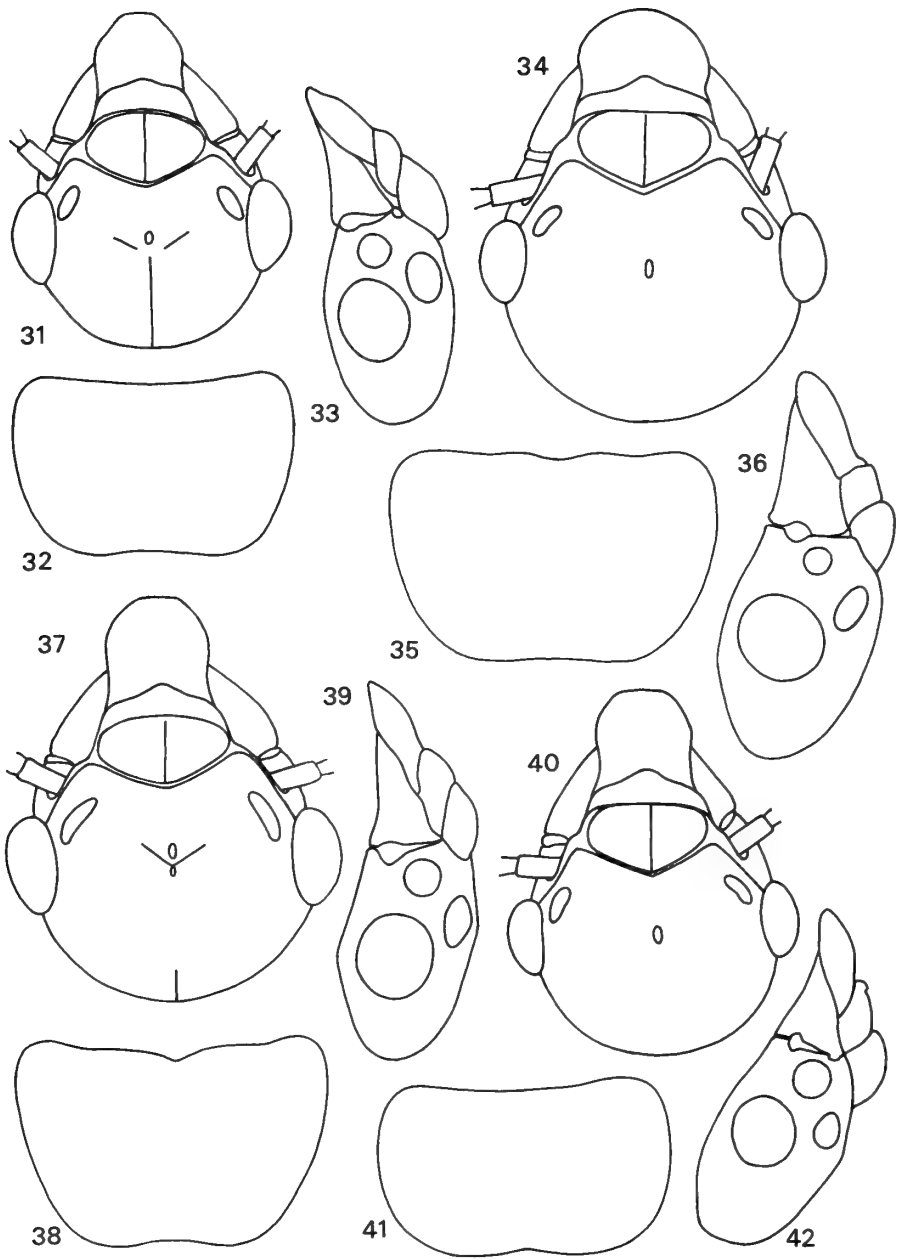
albopartitus 131	incertus 124, 128	mariae 146
alluaudanus 132	kairoonae 139	mulii 147
baginei 133	logani 140	pallidus 124
cheberensis 135	lokoriensis 141	pamelae 148
chomaensis 136	<i>longiceps</i> 131	redenianus 149
darlingtonae 137	lounsburyi 142	tsavoensis 151
edwini 137	luteus 143	<i>usambaricus</i> 149
etiolatus 138	magnocellus 145	vadschaggae 151
globicola 124		



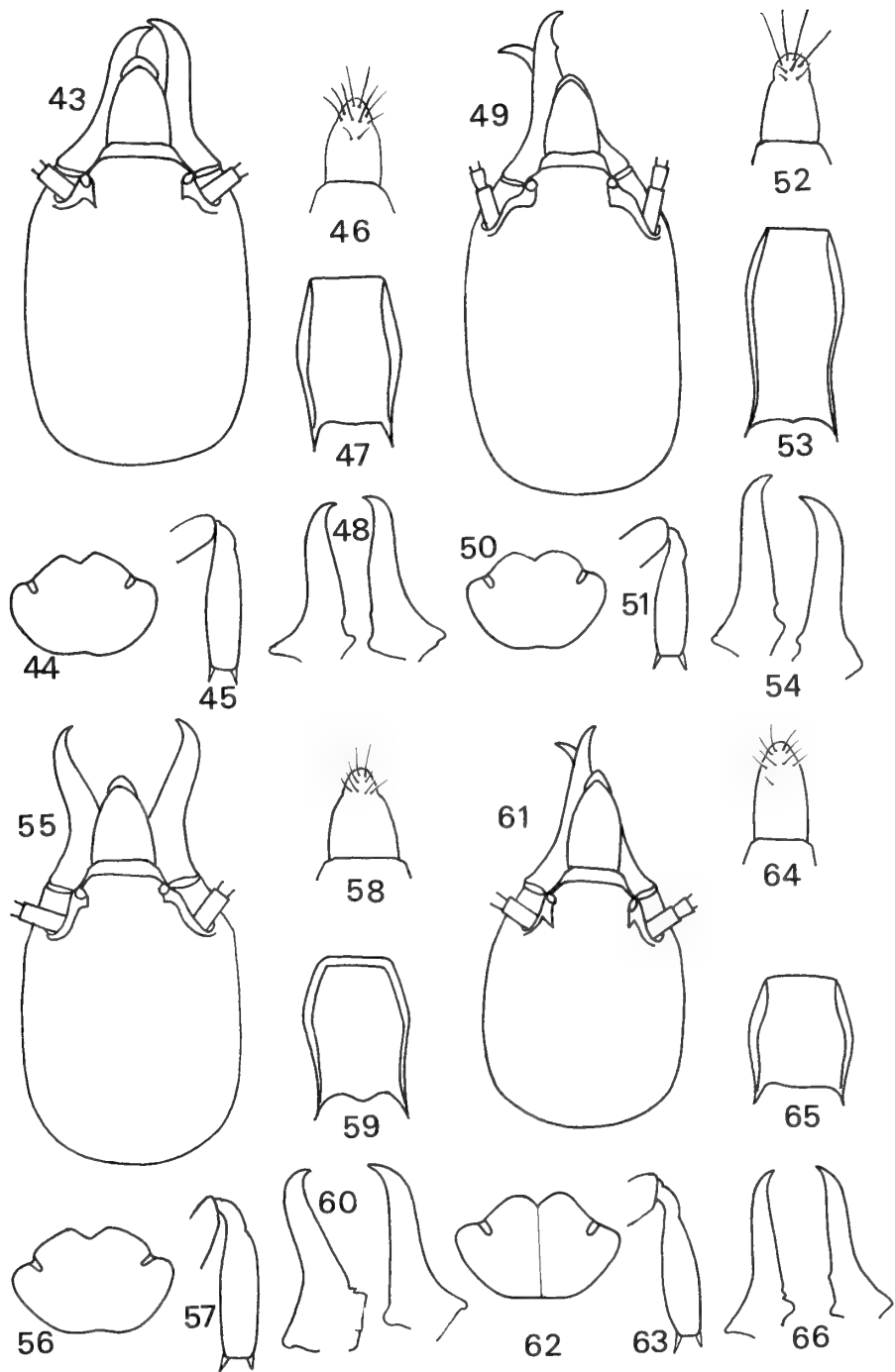
Figs 7–18. *Microtermes* imago head capsules, dorsal and lateral views, and pronota, dorsal views: 7–9, *albopartitus*; 10–12, *alluaudanus*; 13–15, *baginei*; 16–18, *etiolatus*.



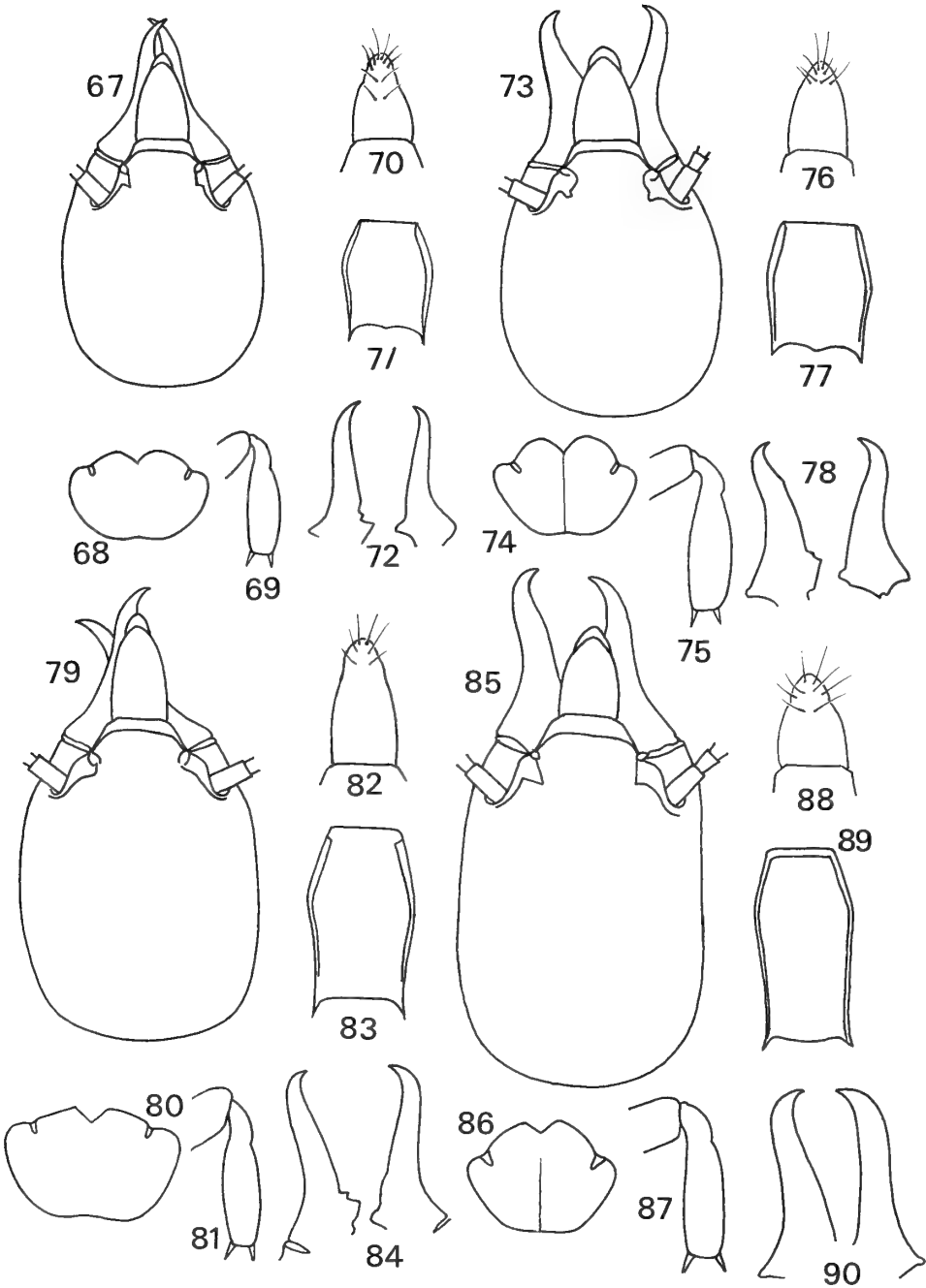
Figs 19–30. *Microtermes* imago head capsule, dorsal and lateral views, and pronota, dorsal views: 19–21, *lounsburyi*; 22–24, *luteus*; 25–27, *mariae*; 28–30, *mulii*.



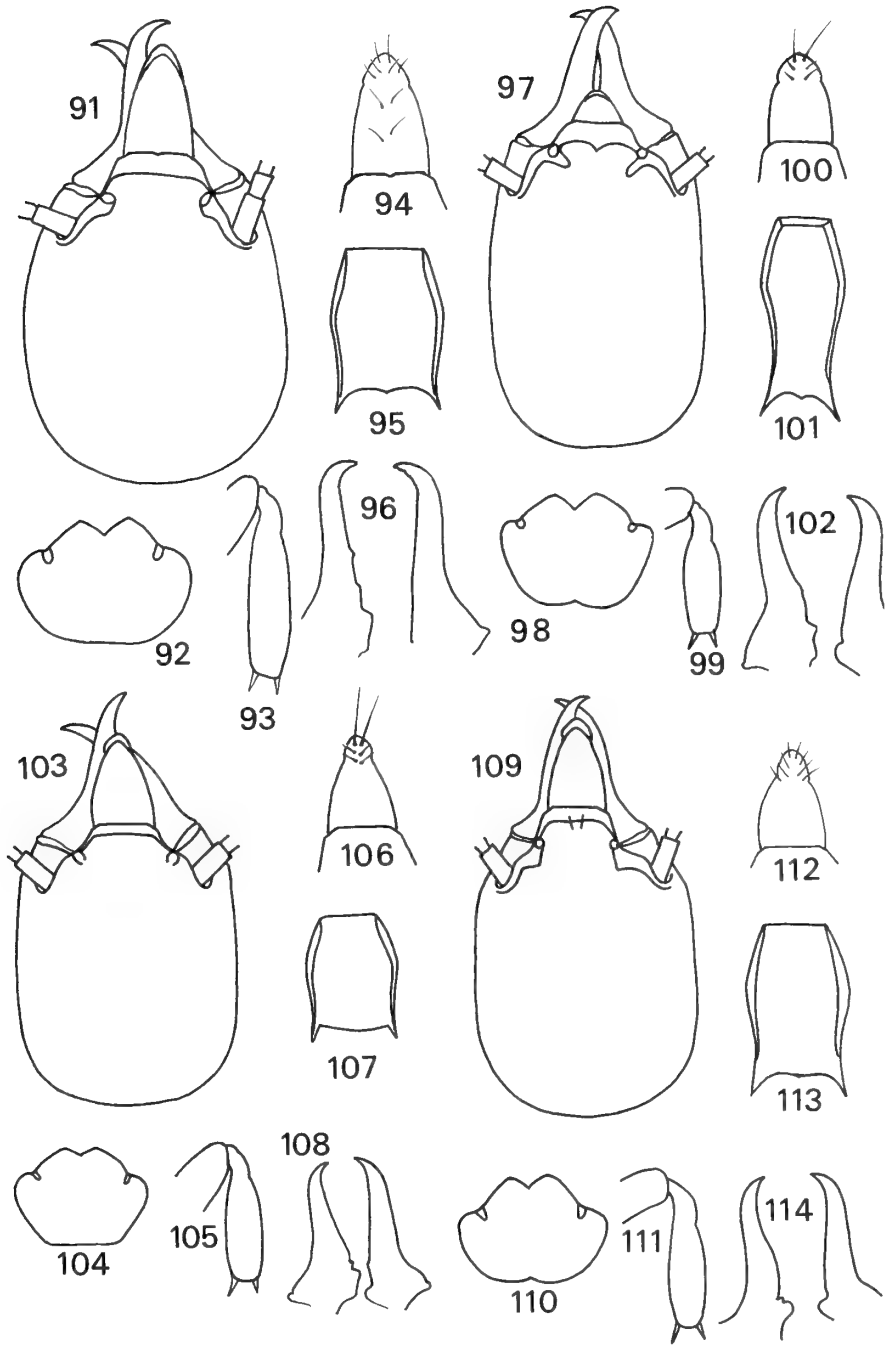
Figs 31–42. *Microtermes* imago head capsule, dorsal and lateral views, and pronota, dorsal views: 31–33, *magnocellus*; 34–36, *pamelae*; 37–39, *redenianus*; 40–42, *vadschaggae*.



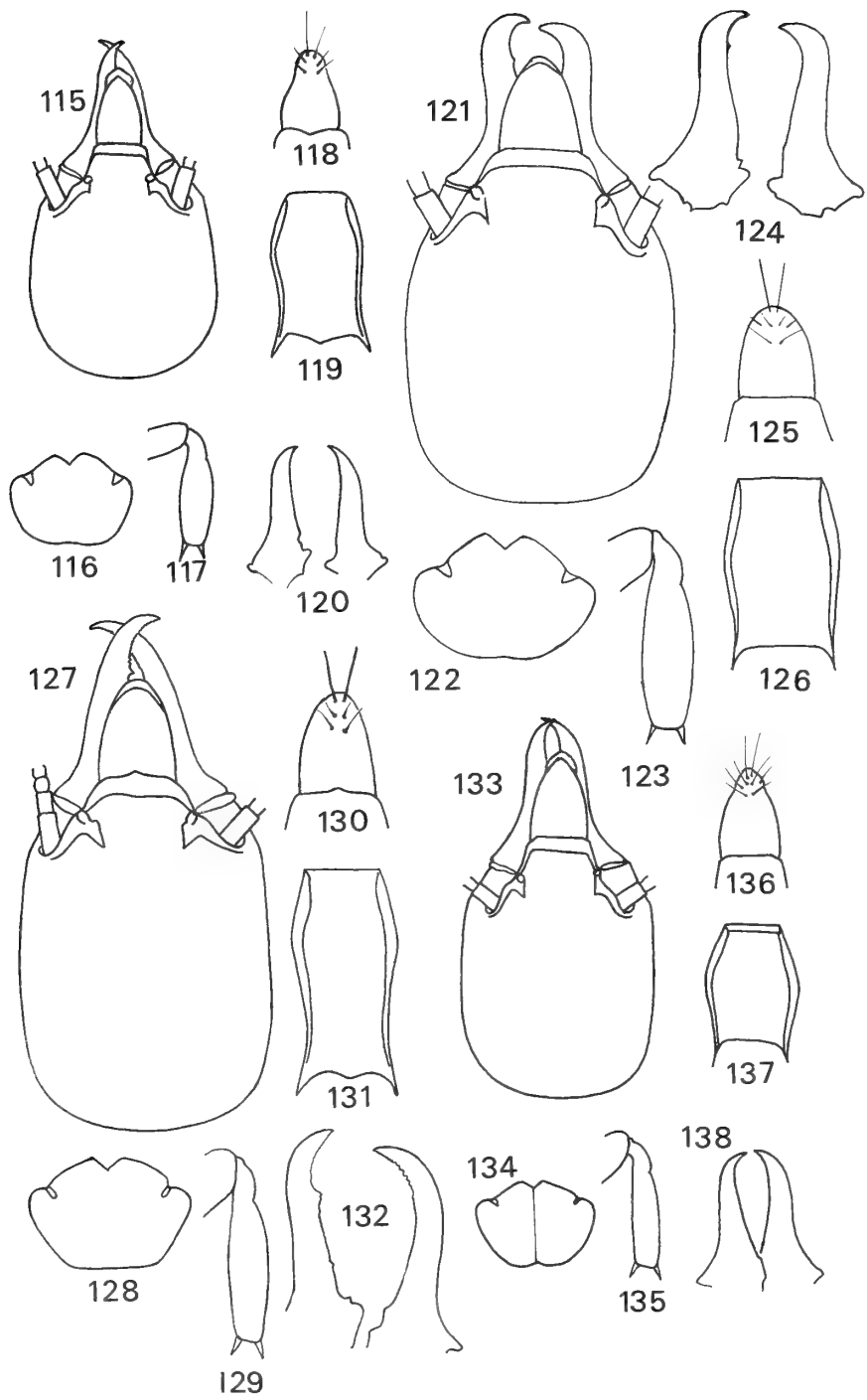
Figs 43–66. *Microtermes* soldier head capsule and pronotum, dorsal views; right foreleg; labrum, dorsal view; postmentum, ventral view; and mandibles, dorsal view (to scale): 43–48, *albopartitus*; 49–54, *alluaudanus*; 55–60, *baginei*; 61–66, *cheberensis*.



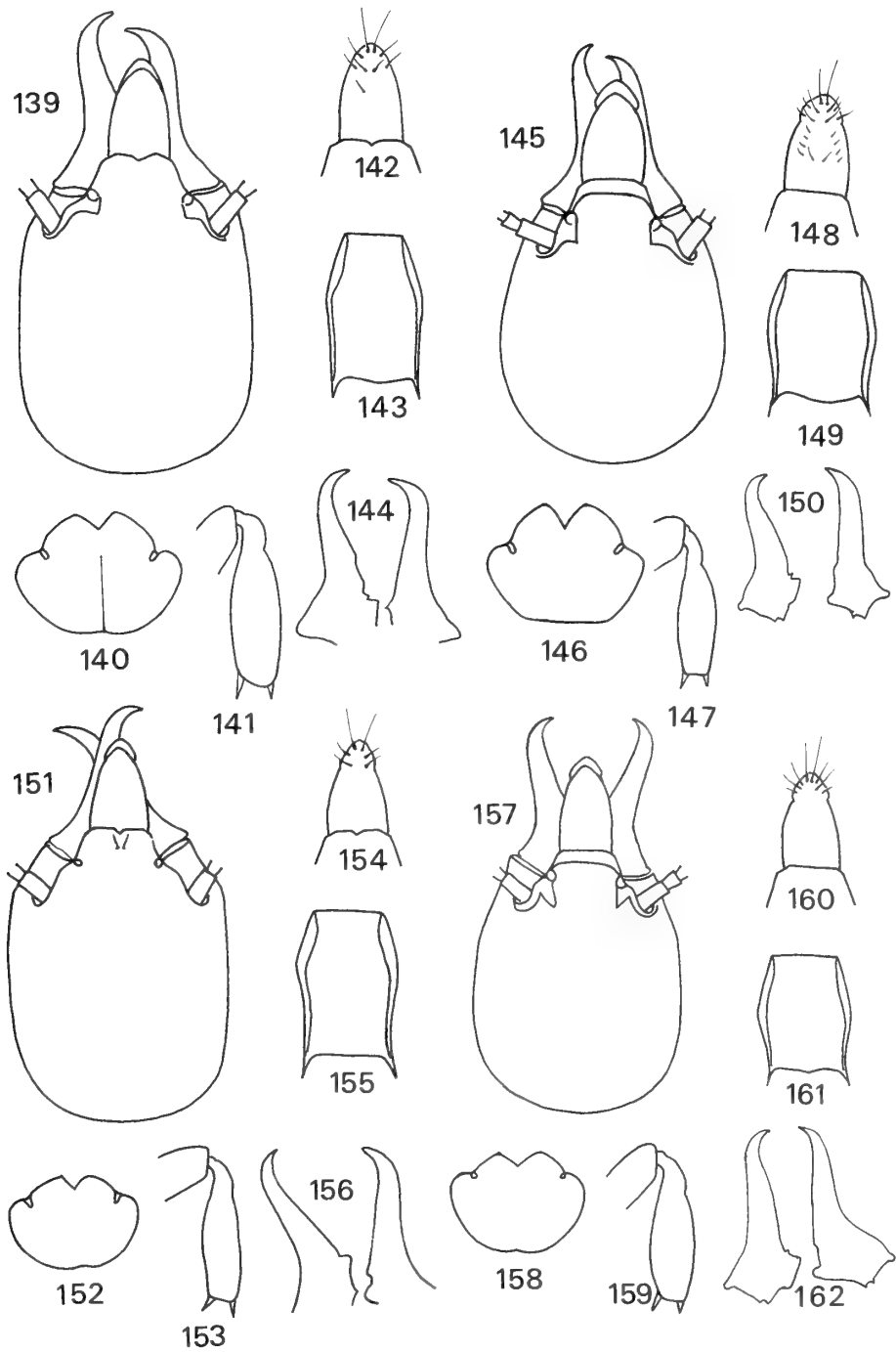
Figs 67–90. *Microtermes* soldier head capsule and pronotum, dorsal views; right foreleg; labrum, dorsal view; postmentum, ventral view; and mandibles, dorsal view (to scale): 67–72, *chomaensis*; 73–78, *darlingtonae*; 79–84, *edwini*; 85–90, *etiolatus*.



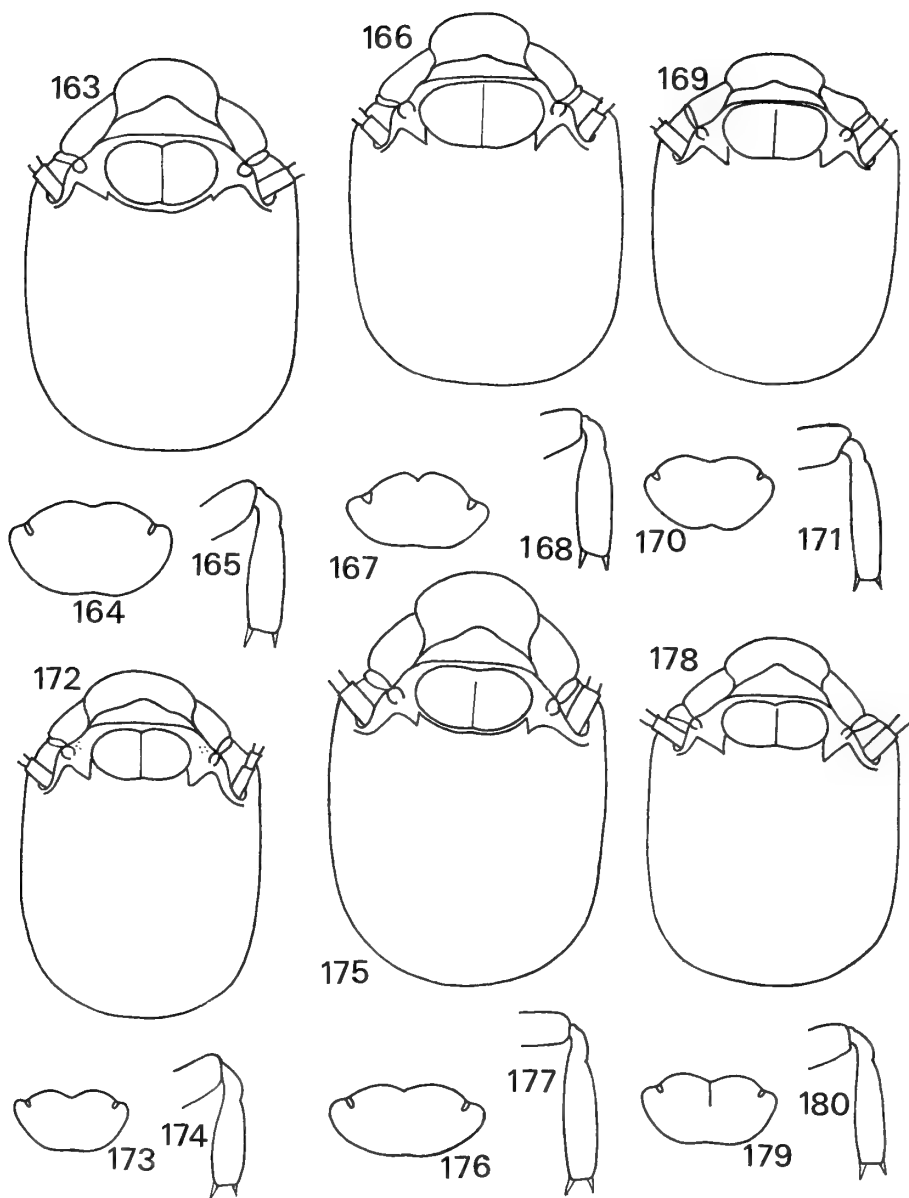
Figs 91–114. *Microtermes* soldier head capsule and pronotum, dorsal views; right foreleg; labrum, dorsal view; postmentum, ventral view; and mandibles, dorsal view (to scale): 91–96, *luteus*; 97–102, *magnocellus*; 103–108, *mariae*; 109–114, *mulii*.



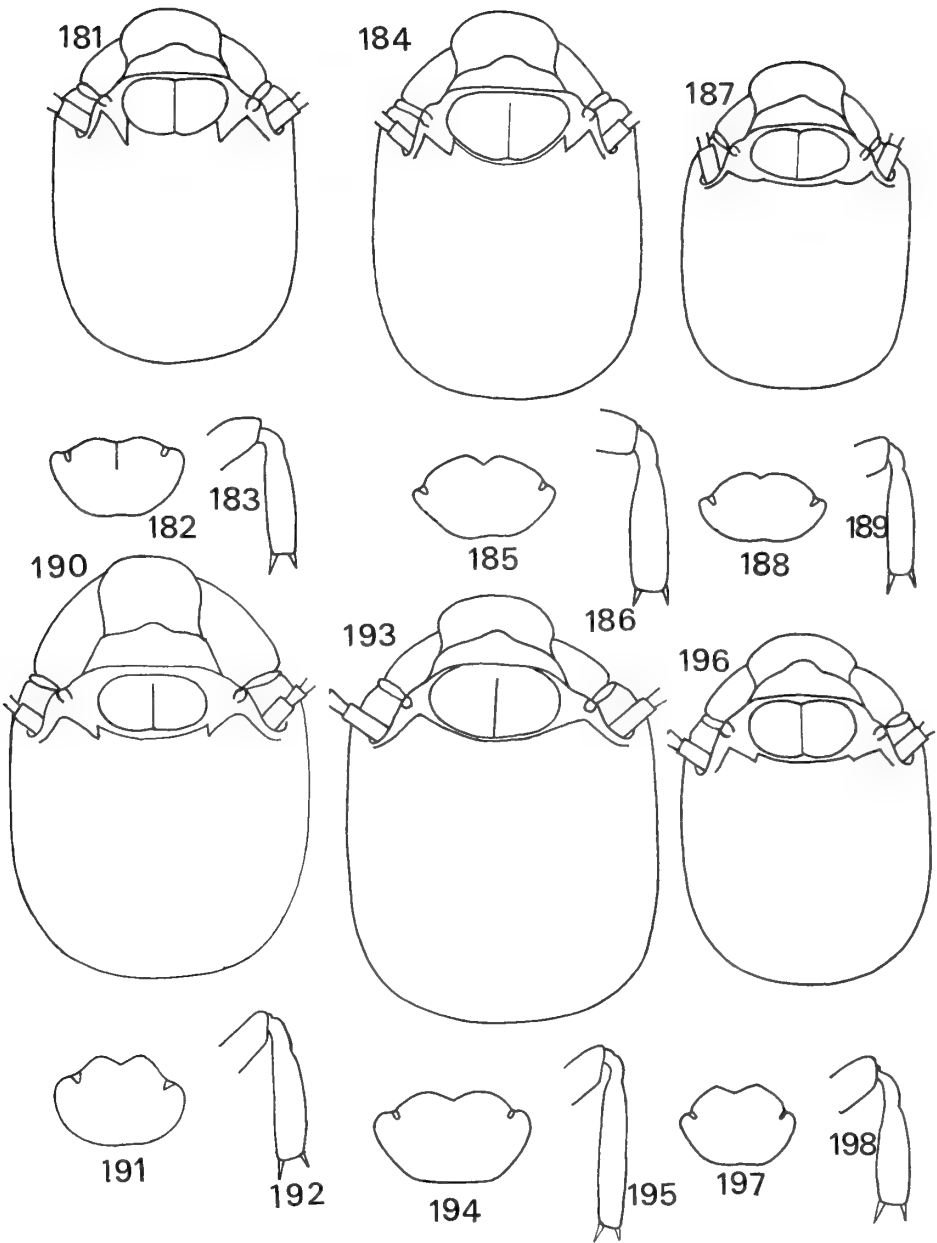
Figs 115–138. *Microtermes* soldier head capsule and pronotum, dorsal views; right foreleg; labrum, dorsal view; postmentum, ventral view; and mandibles, dorsal view (to scale): 115–120, *kairoonae*; 121–126, *logani*; 127–132, *lokoriensis*; 133–138, *lounsburyi*.



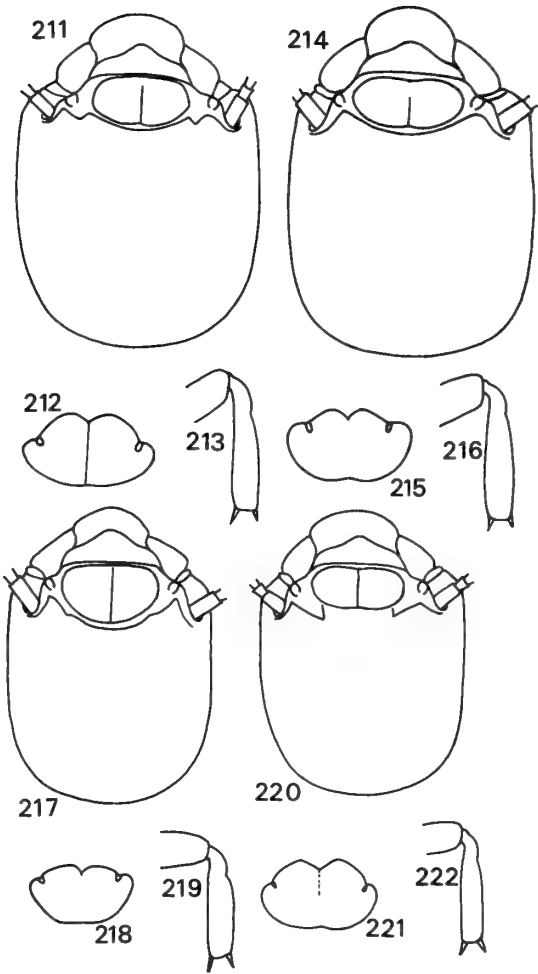
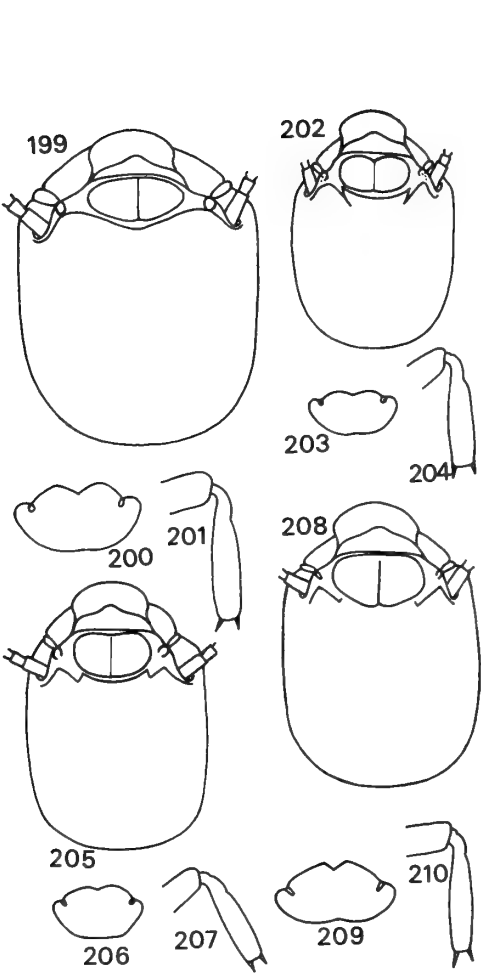
Figs 139–162. *Microtermes* soldier head capsule and pronotum, dorsal views; right foreleg; labrum, dorsal view; postmentum, ventral view; and mandibles, dorsal view (to scale): 139–144, *pamelae*; 145–150, *redenianus*; 151–156, *stavoensis*; 157–162, *vadschaggae*.



Figs 163–180 *Microtermes* major worker head capsule and pronotum, dorsal views; and right foreleg: 163–165, *albopartitus*; 166–168, *alluaudanus*; 169–171, *baginei*; 172–174, *chomaensis*; 175–177, *cheberensis*; 178–180, *darlingtonae*.

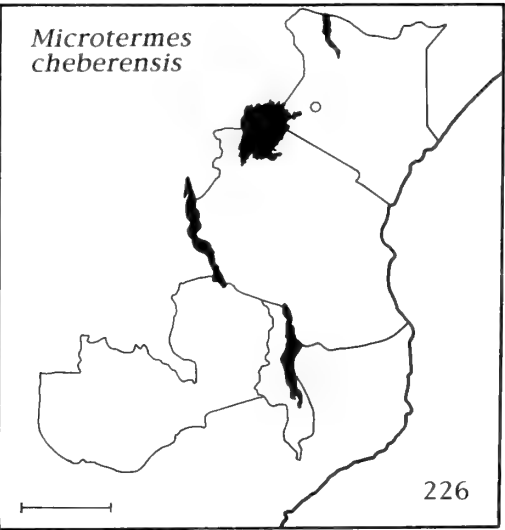
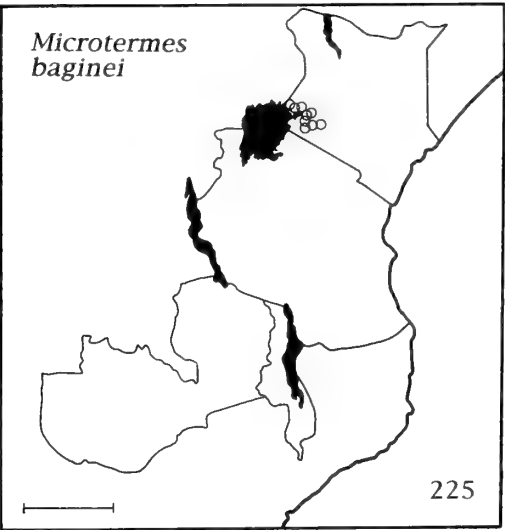
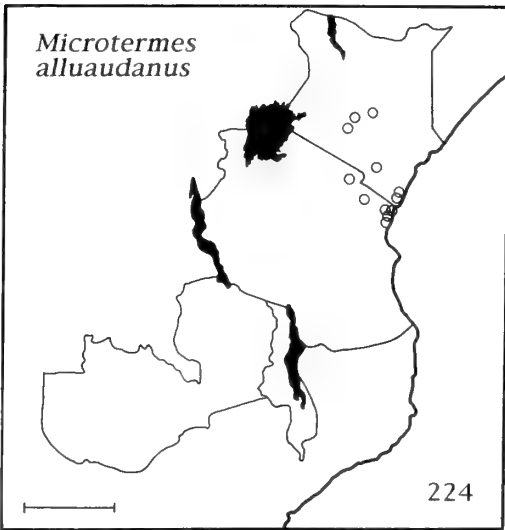
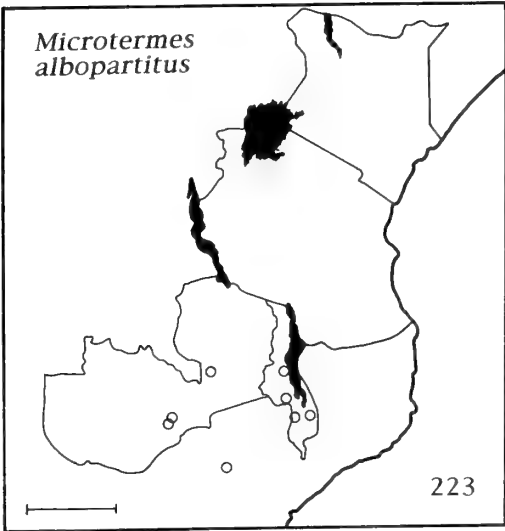


Figs 181–198. *Microtermes* major worker head capsule and pronotum, dorsal views; and right foreleg: 181–183, *edwini*; 184–186, *etiolatus*; 187–189, *kairoonae*; 190–192, *logani*; 193–195, *lokoriensis*; 196–198, *lounsburyi*.

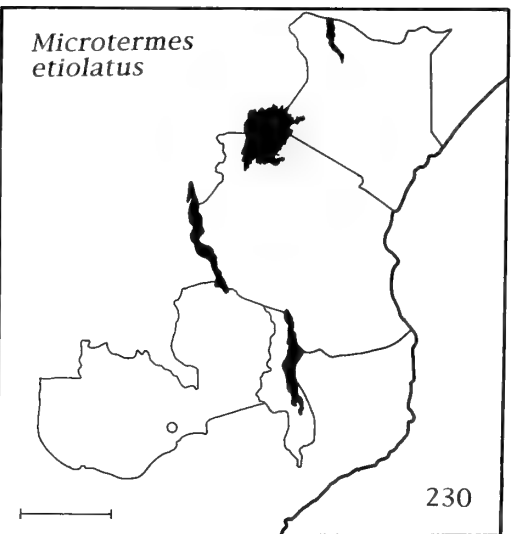
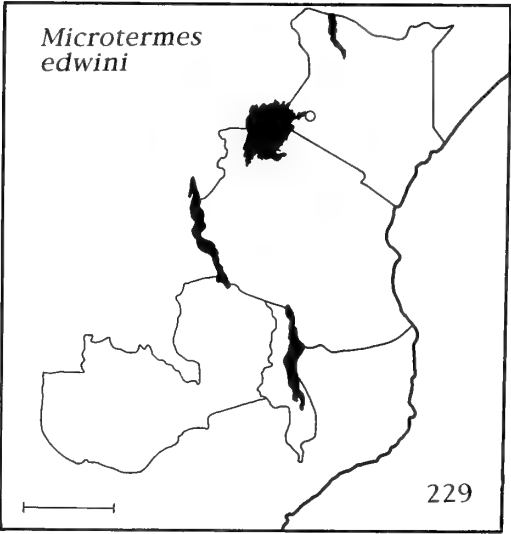
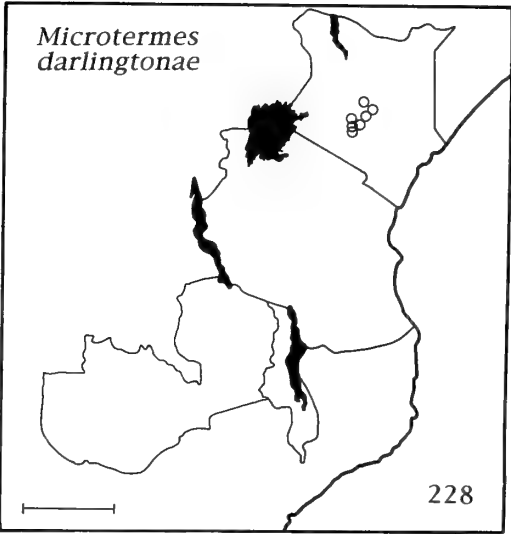
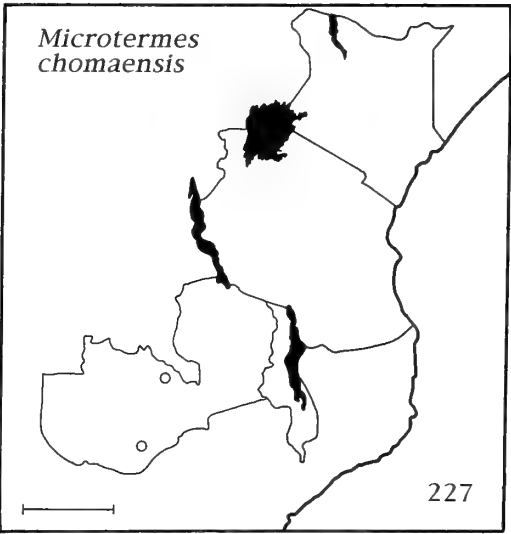


Figs 199–210. *Microtermes* major worker head capsule and pronotum, dorsal views; and right foreleg: 199–201, *luteus*; 202–204, *magnocellus*; 205–207, *mariae*; 208–210, *mulii*.

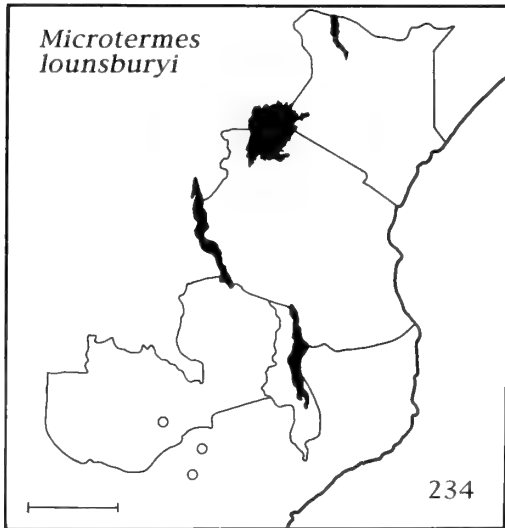
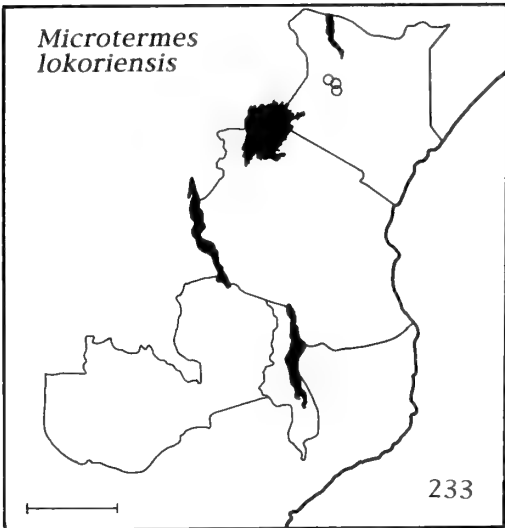
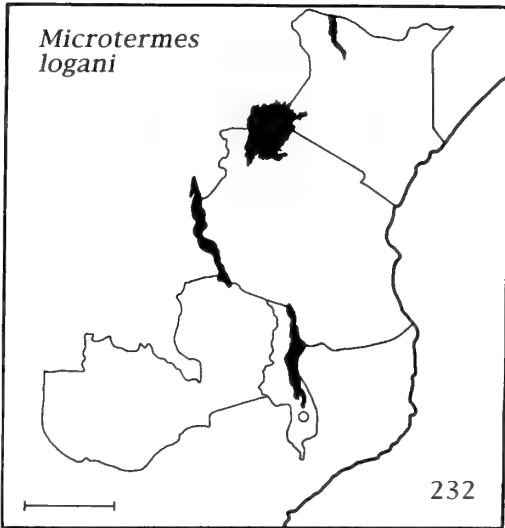
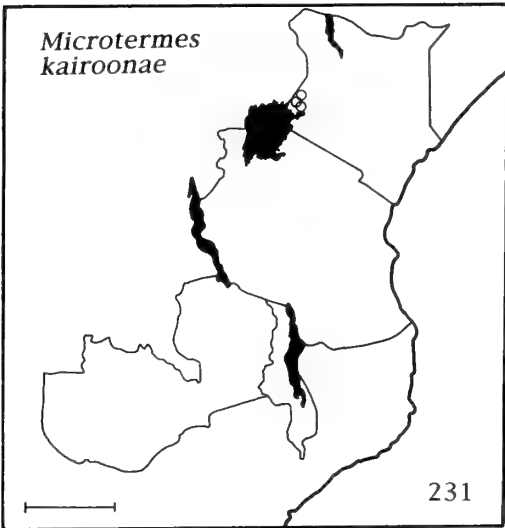
Figs 211–222. *Microtermes* major worker head capsule and pronotum, dorsal views; and right foreleg: 211–213, *pamelae*; 214–216, *redenianus*; 217–219, *tsavoensis*; 220–222, *vadschaggae*.



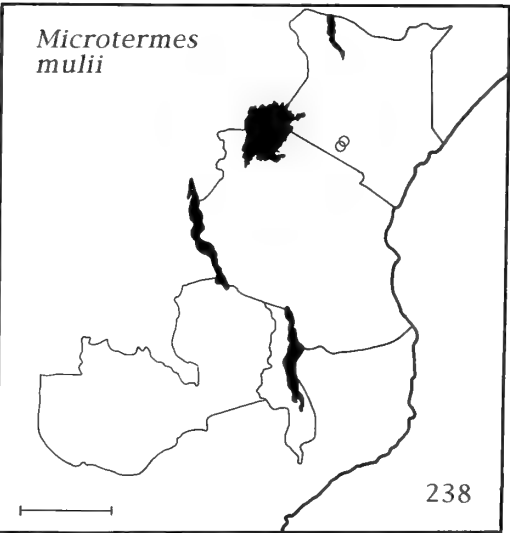
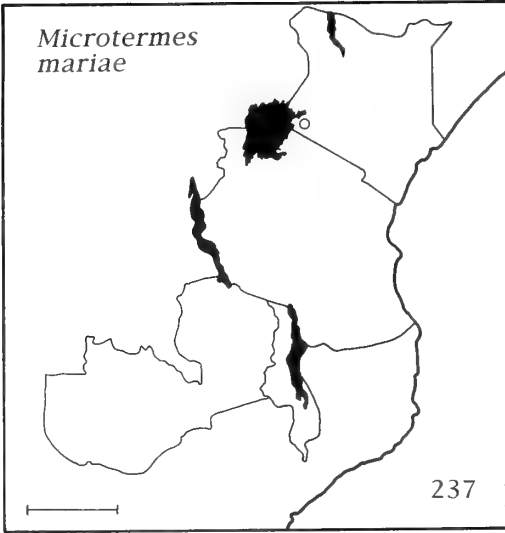
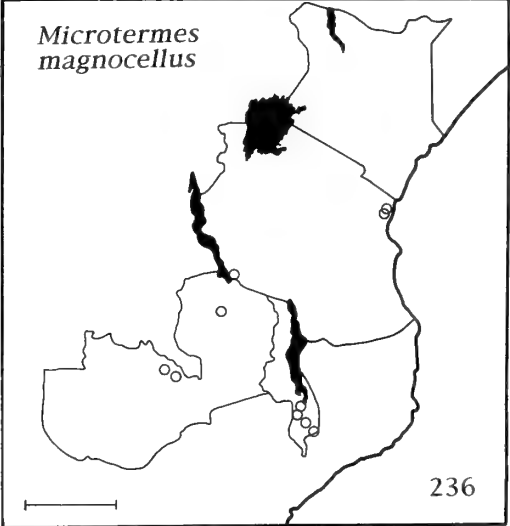
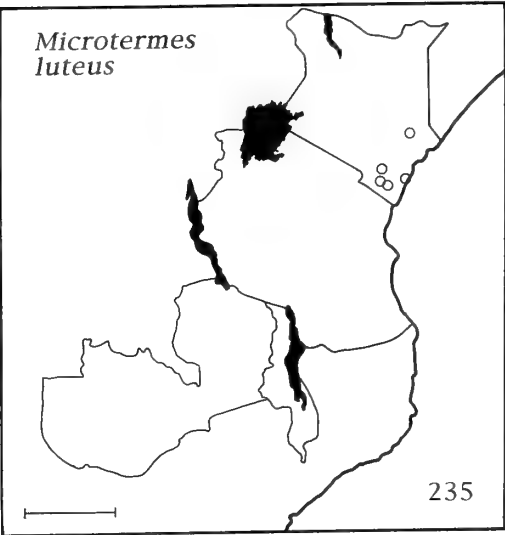
Figs 223–226. Distribution maps for individual species. (Scale bar = 500 km.)



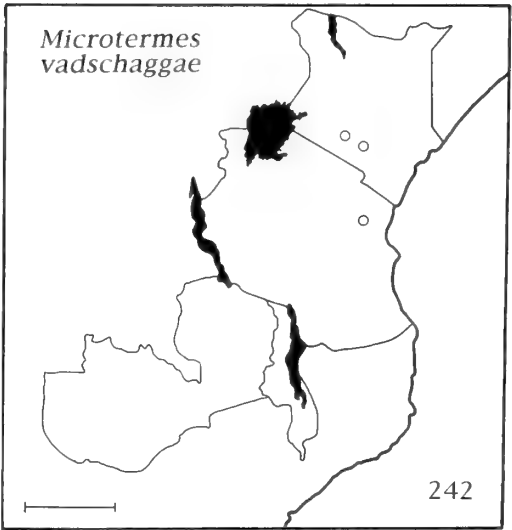
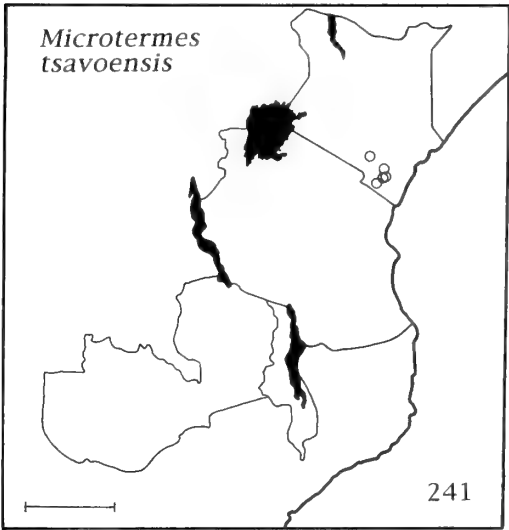
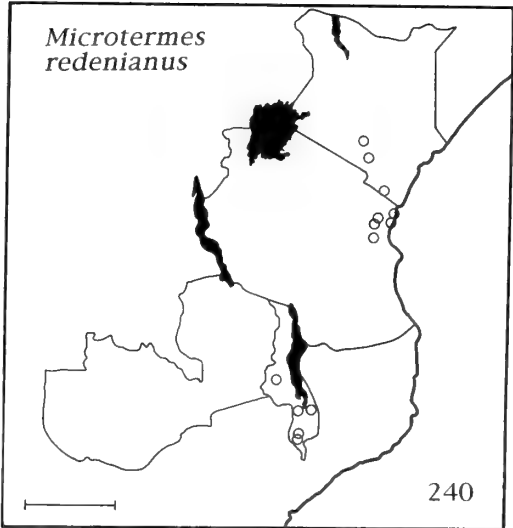
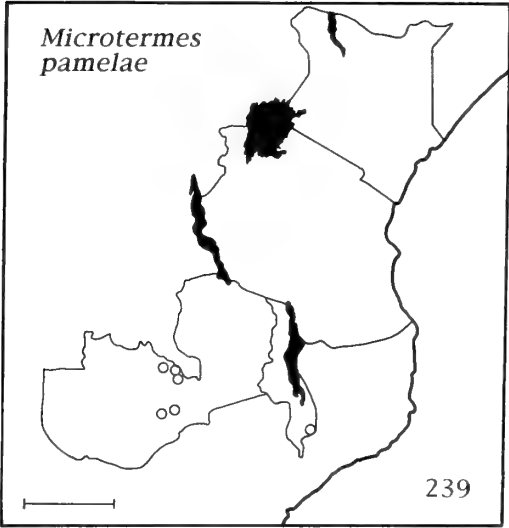
Figs 227–230. Distribution maps for individual species. (Scale bar = 500 km.)



Figs 231–234. Distribution maps for individual species. (Scale bar = 500 km.)



Figs 235–238. Distribution maps for individual species. (Scale bar = 500 km.)



Figs 239–242. Distribution maps for individual species. (Scale bar = 500 km.)

Bulletin of The Natural History Museum

Entomology Series

Earlier Entomology *Bulletins* are still in print. The following can be ordered from Intercept (address on inside front cover). Where the complete backlist is not shown, this may also be obtained from the same address.

Volume 44

- No. 1 The taxonomy, biology and medical importance of *Simulium amazonicum* Goeldi (Diptera: Simuliidae), with a review of related species. A.J. Shelley, R.R. Pinger & M.A.P. Moraes. 1982. Pp. 1–30, 96 figs, 2 tables. £4.50
- No. 2 A revision of the genus *Belonogaster* de Saussure (Hymenoptera: Vespidae). O.W. Richards. 1982. Pp. 31–114, 92 figs. £12.50
- No. 3 The taxonomy and phylogeny of the genus *Polyura* Billberg (Lepidoptera: Nymphalidae). R.L. Smiles. 1982. Pp. 115–237, 159 figs, including 2 colour plates, 2 maps. £19.00
- No. 4 A taxonomic revision of the genus *Gastrimargus* Saussure (Orthoptera: Acrididae). J.M. Ritchie. 1982. Pp. 239–329, 152 figs. £14.00

Volume 45

- No. 1 A catalogue and reclassification of the Ichneumonidae (Hymenoptera) described by C.G. Thomson. M.G. Fitton. 1982. Pp. 1–119, 1 map. £16.50
- No. 2 A taxonomic review of the genus *Phlebotomus* (Diptera: Psychodidae). D.J. Lewis. 1982. Pp. 121–209, 38 figs, 13 maps. £12.60
- No. 3 Stenomine moths of the neotropical genus *Timocratica* (Oecophoridae). V.O. Becker. 1982. Pp. 211–306, 179 figs, 2 tables. £13.50
- No. 4 Afrotropical species of the myrmicine ant genera *Cardiocondyla*, *Leptothorax*, *Melissotarsus*, *Messor* and *Cataulacus* (Formicidae). B. Bolton. 1982. Pp. 307–370, 43 figs. £8.40

Volume 46

- No. 1 The generic and tribal classification of spore-feeding Thysanoptera (Phlaeothripidae: Idolothripinae). L.A. Mound & J.M. Palmer. 1983. Pp. 1–174, 413 figs, 14 tables. £24.50
- No. 2 A revision of the Afrotropical mole-cricket (Orthoptera: Gryllotalpidae). B.C. Townsend. 1982. Pp. 175–203, 63 figs. £4.20
- No. 3 Key to the genera of galerucine beetles of New Guinea, with a review of *Sastra* and related new taxa (Chrysomelidae). S.L. Shute. 1983. Pp. 205–266, 150 figs, 10 maps. £9.00
- No. 4 The Afrotropical dacetinae ants (Formicidae). B. Bolton. 1983. Pp. 267–416, 81 figs. £21.00

Volume 47

- No. 1 A new genus of oriental lacewings (Neuroptera: Chrysopidae). S.J. Brooks. 1983. Pp. 1–26, 95 figs. £4.00
- No. 2 The leafhopper genus *Batracomorphus* (Cicadellidae: Iassinae) in the eastern Oriental and Australian regions. W.J. Knight. 1983. Pp. 27–210, 977 figs. £25.75
- No. 3 The Afrotropical idiocerine leafhoppers (Homoptera: Cicadellidae). M.D. Webb. 1983. Pp. 211–257, 146 figs, 2 tables. £7.00

Volume 48

- No. 1 Gelechiid moths of the genus *Mirificarma*. L.M. Pitkin. 1984. Pp. 1–70, 112 figs, 2 tables. £10.00
- No. 2 Macronematine caddisflies of the genus *Amphipsyche* (Trichoptera: Hydropsychidae). P.C. Barnard. 1984. Pp. 71–130, 182 figs. £9.00
- No. 3 A review of the genera of Indo-Pacific Encyrtidae (Hymenoptera: Chalcidoidea). J.S. Noyes & M. Hayat. 1984. Pp. 131–395, 450 figs. £39.75

Volume 49

- No. 1 Afrotropical jumping plant lice of the family Triozidae (Homoptera: Psylloidea). D. Hollis. 1984. Pp. 1–102, 324 figs. £15.30
- No. 2 The taxonomy of the western European grasshoppers of the genus *Euchorthippus*, with special reference to their songs (Orthoptera: Acrididae). D.R. Ragge & W.J. Reynolds. 1984. Pp. 103–151, 88 figs. £7.20
- No. 3 An historical review of the higher classification of the Noctuidae (Lepidoptera). I.J. Kitching. 1984. Pp. 153–234, 4 figs. £12.00
- No. 4 The Pimplinae, Xoridinae, Acaenitinae and Lycorininae (Hymenoptera: Ichneumonidae) of Australia. I.D. Gauld. 1984. Pp. 235–339, 100 figs, 18 maps. £15.75
- No. 5 The Palaearctic species of *Ascogaster* (Hymenoptera: Braconidae). T. Huddleston. 1984. Pp. 341–392, 79 figs. £7.80

Volume 50

- No. 1 Taxonomy of Neotropical Derbidae in the new tribe Mysidiini (Homoptera). P.S. Broomfield. 1985. Pp. 1–152, 501 figs. £22.80
- No. 2 Nymphal taxonomy and systematics of the Psylloidea (Homoptera). I.M. White & I.D. Hodkinson. 1985. Pp. 153–301, 201 figs, 18 tables. £23.00
- No. 3 The Whitefly of New Guinea (Homoptera: Aleyrodidae). J.H. Martin. 1985. Pp. 303–351, 48 figs. £8.00

Volume 51

- No. 1 The ichneumon-fly genus *Banchus* (Hymenoptera) in the Old World. M.G. Fitton. 1985. Pp. 1–60, 129 figs. £10.80
- No. 2 The phylogeny, classification and evolution of parasitic wasps of the subfamily Ophioninae (Ichneumonidae). I.D. Gauld. 1985. Pp. 61–185, 52 figs. £21.00
- No. 3 A cladistic analysis and classification of trichodectid mammal lice (Phthiraptera: Ischnocera). C.H.C. Lyal. 1985. Pp. 187–346, 250 figs. £26.00
- No. 4 The British and some other European Eriococcidae (Homoptera: Coccoidea). D.J. Williams. 1985. Pp. 347–393, 18 figs. £8.00

Volume 52

- No. 1 The sandflies of Egypt (Diptera: Phlebotominae). R.P. Lane. 1986. Pp. 1–35, 80 figs, 4 tables. £5.60
- No. 2 Fungus moths: a review of the Scardiinae (Lepidoptera: Tineidae). G.S. Robinson. 1986. Pp. 37–181, 200 figs. £24.00
- No. 3 A revision of the European Agathidinae (Hymenoptera: Braconidae). G.E.J. Nixon. 1986. Pp. 183–242, 68 figs. £11.00
- No. 4 A key to the Afrotropical genera of Eucoilidae (Hymenoptera) with a revision of certain genera. J. Quinlan. 1986. Pp. 243–366, 359 figs. £21.00

Volume 53

- No. 1 A review of Miletini (Lepidoptera: Lycaenidae). J.N. Eliot. 1986. Pp. 1–105, 108 figs. £18.00
- No. 2 Australian ichneumonids of the tribes Labenini and Poecilocryptini. I.D. Gauld & G.A. Holloway. 1986. Pp. 107–149, 65 figs. £8.40
- No. 3 The tribe Pseudophloeini (Hemiptera: Coreidae) in the Old World tropics with a discussion on the distribution of the Pseudophloeinae. W.R. Dolling. 1986. Pp. 151–212, 121 figs. £11.50
- No. 4 The songs of the western European grasshoppers of the genus *Omocestus* in relation to their taxonomy (Orthoptera: Acrididae). D.R. Ragge. 1986. Pp. 213–249, 128 figs. £7.50
- No. 5 The structure and affinities of the Hedyloidea: a new concept of the butterflies. M.J. Scoble. 1986. Pp. 251–286, 102 figs. £7.00

Volume 54

- No. 1 Studies on the Old World species of *Holothrips* (Thysanoptera: Phlaeothripidae). S. Okajima. 1987. Pp. 1–74, 207 figs. £14.00
- No. 2 Spectacles and Silver Ys: a synthesis of the systematics, cladistics and biology of the Plusiinae (Lepidoptera: Noctuidae). I.J. Kitching. 1987. Pp. 75–261, 465 figs. £36.00
- No. 3 A review of the *Solenopsis* genus-group and revision of Afrotropical *Monomorium* Mayr (Hymenoptera: Formicidae). B. Bolton. 1987. Pp. 263–452, 100 figs. £36.50

Volume 55

- No. 1 A reclassification of the European Tetrastichinae (Hymenoptera: Eulophidae), with a revision of certain genera. M.W.R. de V. Graham. 1987. Pp. 1–392, 744 figs. £75.00
- No. 2 The songs of the western European grasshoppers of the genus *Stenobothrus* in relation to their taxonomy (Orthoptera: Acrididae). D.R. Ragge. 1987. Pp. 393–424, 116 figs. £6.00

Volume 56

- No. 1 The legume-feeding psyllids (Homoptera) of the wet Palaearctic Region. I.D. Hodkinson & D. Hollis. 1987. Pp. 1–86, 294 figs. £16.00
- No. 2 A review of the Malvales-feeding psyllid family Carsidaridae (Homoptera). D. Hollis. 1987. Pp. 87–127, 94 figs. £6.00
- No. 3 A review of the Rhadalinae (=Aplocneminae) (Coleoptera: Melyridae). E.R. Peacock. 1987. Pp. 129–170, 59 figs. £8.00
- No. 4 A revision of some Afrotropical genera of Eucoilidae (Hymenoptera). J. Quinlan. 1988. Pp. 171–229, 199 figs. £11.00

Volume 57

- No. 1 A survey of the Ophioninae (Hymenoptera: Ichneumonidae) of tropical Mesoamerica with special reference to the fauna of Costa Rica. I.D. Gauld. 1988. Pp. 1–309, 352 figs, 32 maps. £52.00
- No. 2 A taxonomic revision of *Alabagrus* (Hymenoptera: Braconidae). M.J. Sharkey. 1988. Pp. 311–437, 28 figs, 22 maps. £24.50
- No. 3 A taxonomic revision of *Caryocolum* (Lepidoptera: Gelechiidae). P. Huemer. 1988. Pp. 439–571, 221 figs. £25.00

Volume 58

- No. 1 The mealybug genus *Planococcus* (Homoptera: Pseudococcidae). J.M. Cox. 1989. Pp. 1–78, 40 figs.
- No. 2 The Simuliidae (Diptera) of the Santiago onchocerciasis focus of Ecuador. A.J. Shelley, M. Arzube & C.A. Couch. 1989. Pp. 79–130, 153 figs (including 2 plates in colour).

Volume 59

- No. 1 The songs of the western European bush-crickets of the genus *Platycleis* in relation to their taxonomy (Orthoptera: Tettigoniidae). D.R. Ragge. 1990. Pp. 1–35.
- No. 2 A reclassification of the *Melanotus* group of genera (Coleoptera: Elateridae). C.M.F. von Hayek. 1990. Pp. 37–115.
- No. 2 The green lacewings of the world: a generic review (Neuroptera: Chrysopidae). S.J. Brooks & P.C. Barnard. 1990. Pp. 117–286.

Volume 60

- No. 1 The bumble bees of the Kashmir Himalaya (Hymenoptera: Apidae, Bombini). P.H. Williams. 1991. Pp. 1–204.
- No. 2 *Sattleria*: a European genus of brachypterous alpine moths (Lepidoptera: Gelechiidae). L.M. Pitkin & K. Sattler. 1991. Pp. 205–241.
- A review of wing reduction in Lepidoptera. K. Sattler. 1991. Pp. 243–288.

Volume 61

- No. 1 *Thrips* (Thysanoptera) from Pakistan to the Pacific: a review. J.M. Palmer. 1992. Pp. 1–76.
- No. 2 Neotropical red-brown Ennominae in the genera *Thysanopyga* Herrich-Schäffer and *Perissopteryx* Warren (Lepidoptera: Geometridae). M. Kruger & M.J. Scoble. 1992. Pp. 77–148.

Volume 62

- No. 1 *Caloptilia* leaf-miner moths (Gracillariidae) of South-East Asia. Decheng Yuan and Gaden S. Robinson. 1993. Pp. 1–37.
- No. 2 Neotropical Emerald moths of the genera *Nemoria*, *Lissochlora* and *Chavarriella*, with particular reference to the species of Costa Rica (Lepidoptera: Geometridae, Geometrinae). Linda M. Pitkin. 1993. Pp. 39–159.

Volume 63

- No. 1 A revision of the Indo-Pacific species of *Ooencyrtus* (Hymenoptera: Encyrtidae), parasitoids of the immature stages of economically important insect species (mainly Hemiptera and Lepidoptera). D.W. Huang and J.S. Noyes. Pp. 1–135.
- No. 2 A taxonomic review of the common green lacewing genus *Chrysoperla* (Neuroptera: Chrysopidae). S.J. Brooks. Pp. 137–210.

Volume 64

- No. 1 Revision of the neotropical genus *Oospila* Warren (Lepidoptera: Geometridae) M.A. Cook and M.J. Scoble. Pp. 1–115.
- No. 2 Encyrtidae of Costa Rica (Hymenoptera: Chalcidoidea): the genus *Aenasius* Walker, parasitoids of mealybugs (Homoptera: Pseudococcidae). J.S. Noyes and H. Ren. Pp. 117–164.

Volume 65

- No. 1 A revised classification of the Asian and Pacific selenocephaline leafhoppers (Homoptera: Cicadellidae). Y. Zhang and M.D. Webb. Pp. 1–103.
- No. 2 Encyrtidae (Hymenoptera: Chalcidoidea) of Costa Rica: the genera and species associated with jumping plant-lice (Homoptera: Psyllodea). J.S. Noyes and P. Hanson. Pp. 105–164.

Volume 66

- No. 1 Biosystematic studies on the Simuliidae (Diptera) of the Amazonia onchocerciasis focus. A.J. Shelley, C.A. Lowry, M. Maia-Herzog, A.P.A. Luna Dias and M.A.P. Moraes. Pp. 121.

CONTENTS

- 123 *Microtermes* in East Africa (Isoptera: Termitidae: Macrotermitinae)
Solomon Bacchus